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(54) Storing and retrieving collaboratively processed information

(57) A collaborative information processing system has terminal units 1A, 1B, 1C interconnected through a network 4. Each terminal unit includes a microprocessor 2A, 2B, 2C with a program for controlling the execution of various application programs and communication with other terminal units, input/output devices such as a display screen and keyboard, and a telephone set. A plurality of users join in a conference to perform group work by making reference to material displayed identically (Fig 2) in a window on the screen of each terminal unit and making conversation through the telephone set. Records of information including the outline of the group work, names and images of participants, and names of materials and data created or referenced during the conference are stored automatically in a database 18 so that the records can readily be retrieved in the future.

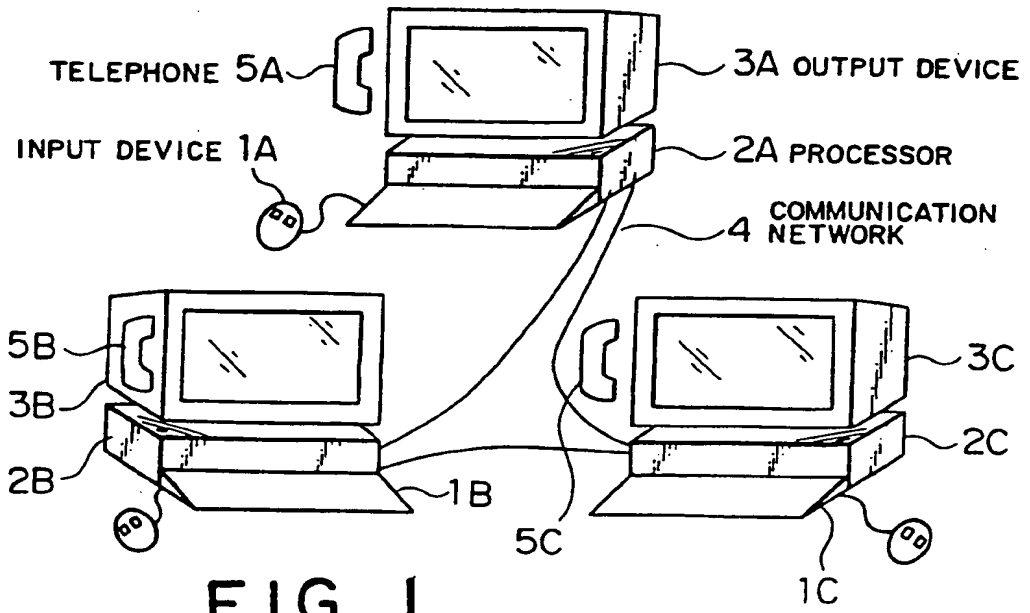


FIG. 1

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FIG. 1

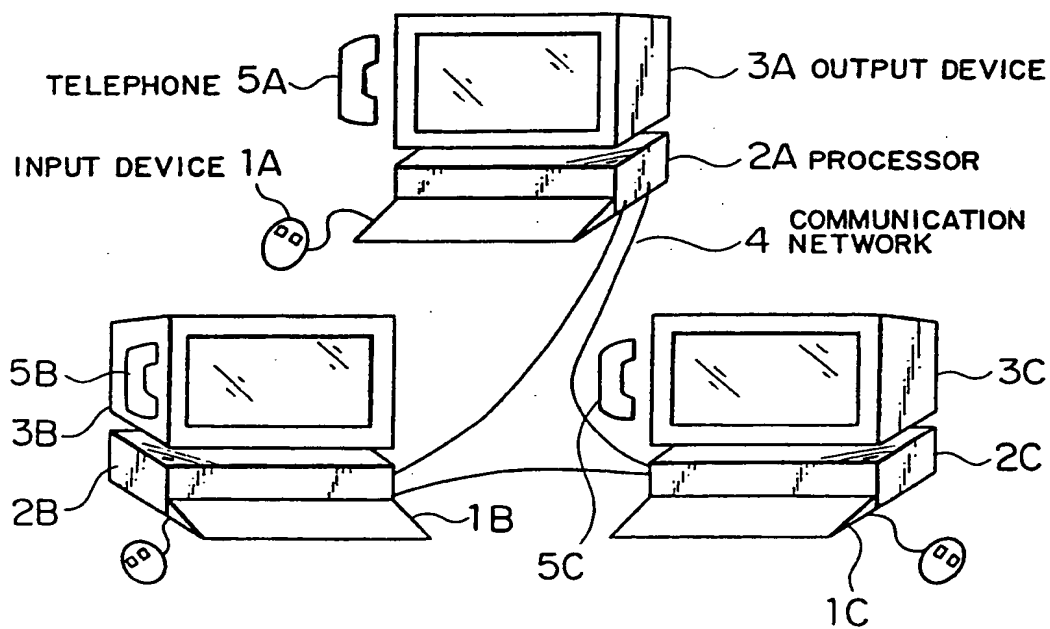


FIG. 2

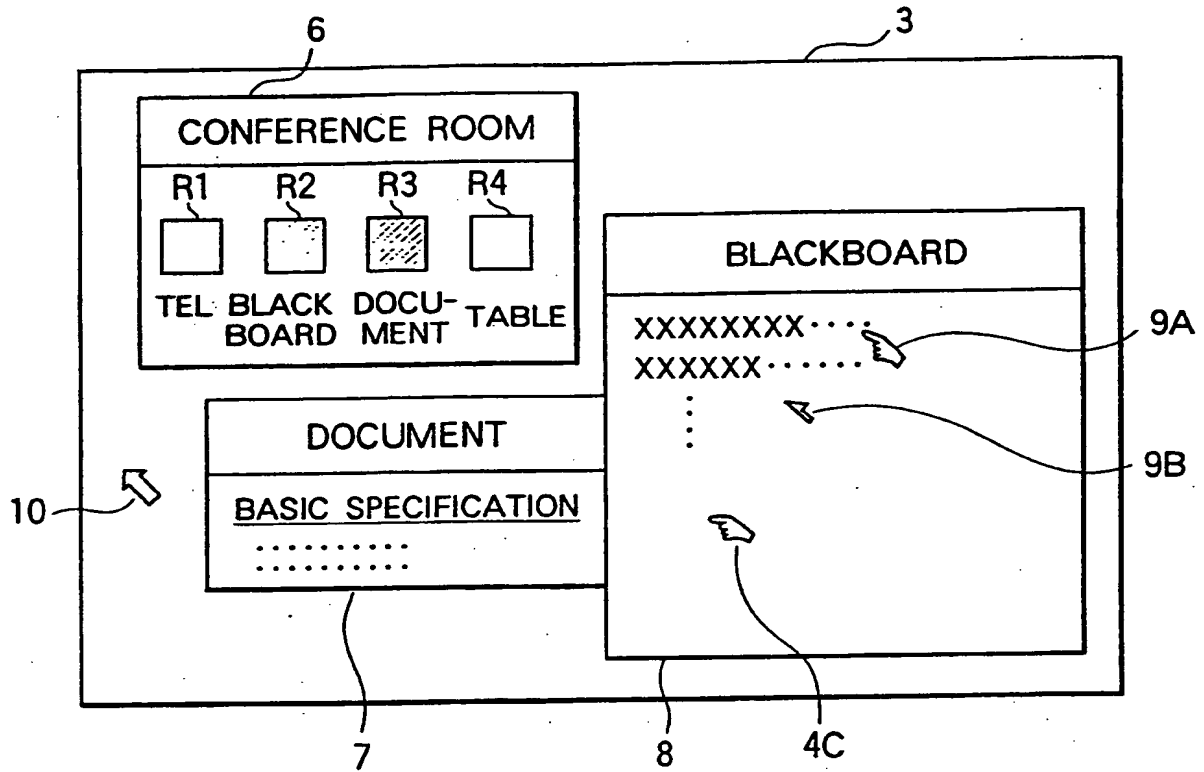
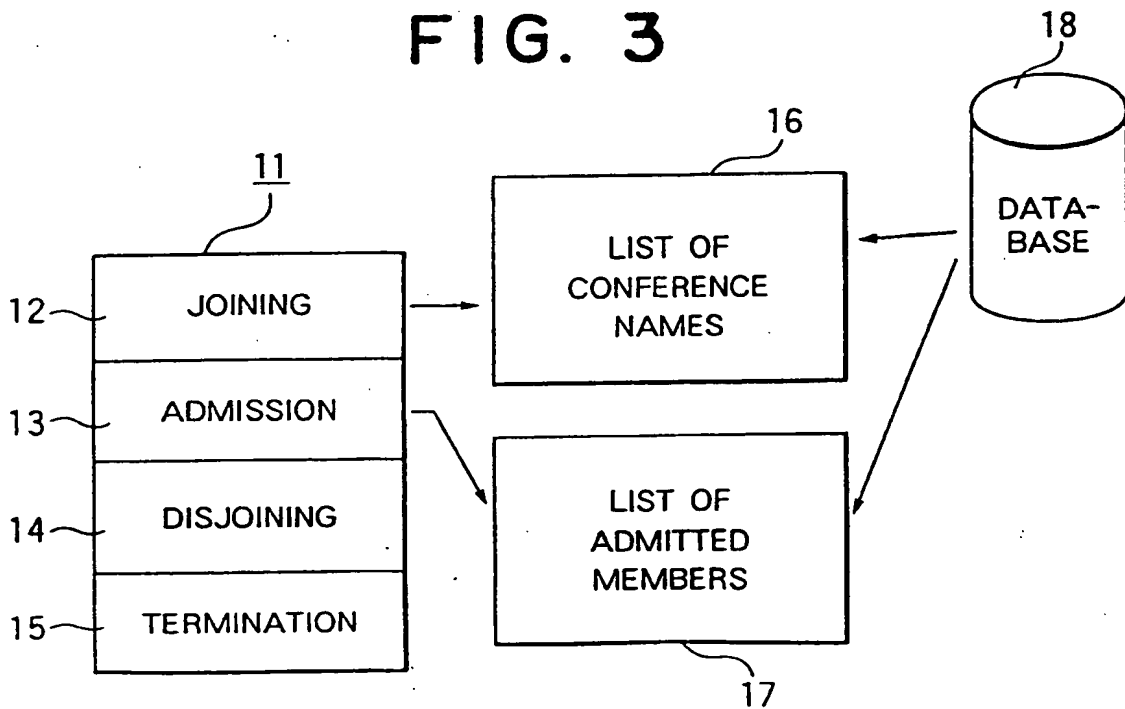
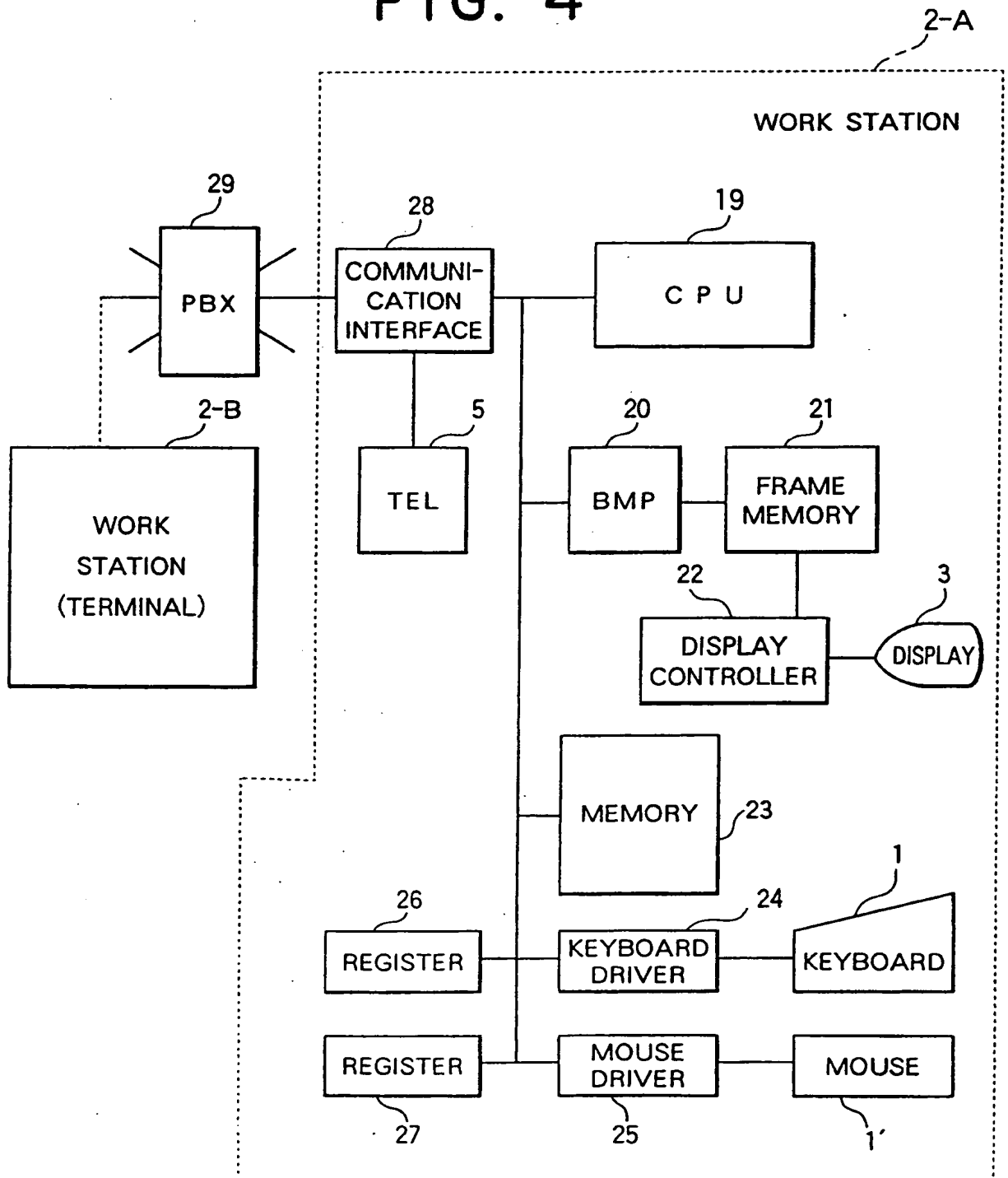


FIG. 3



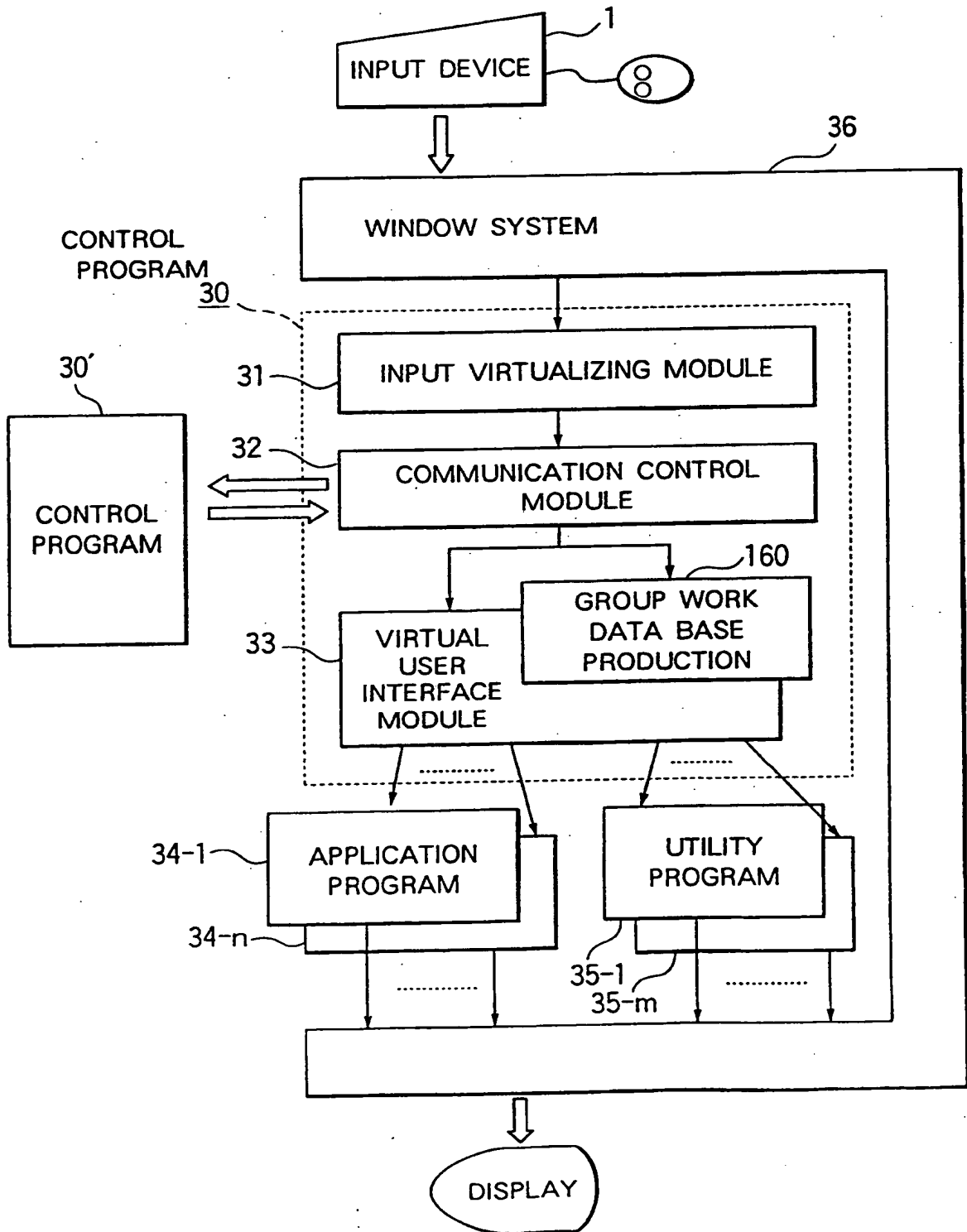
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FIG. 4



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FIG. 5



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FIG. 6

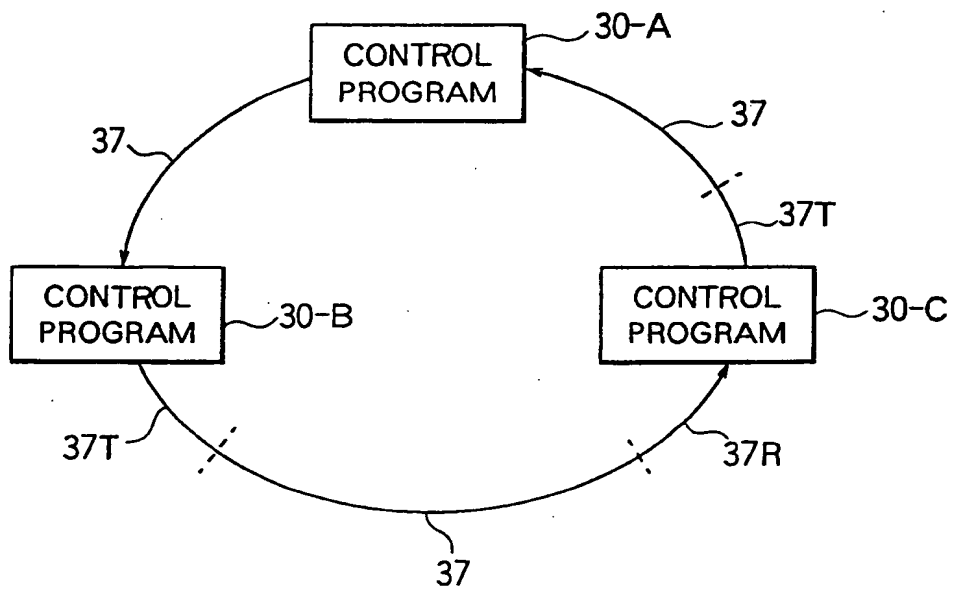


FIG. 7 A



FIG. 7 B

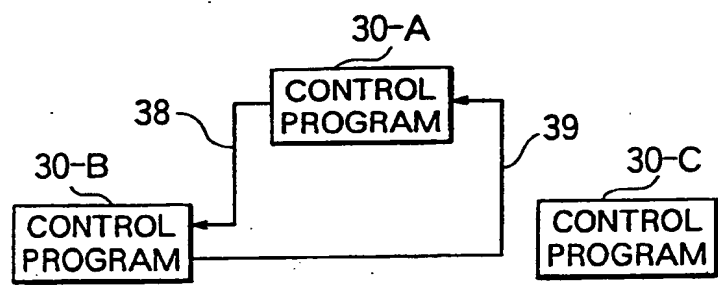


FIG. 7 C

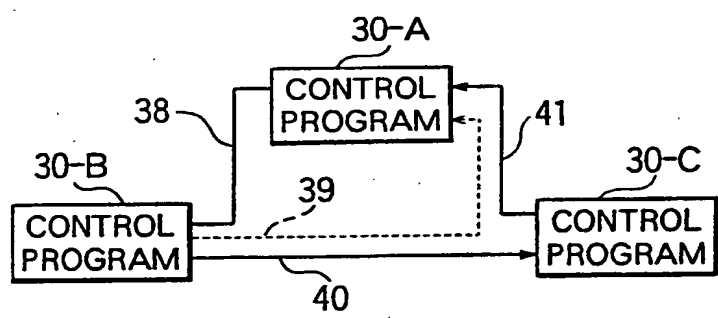


FIG. 7 D

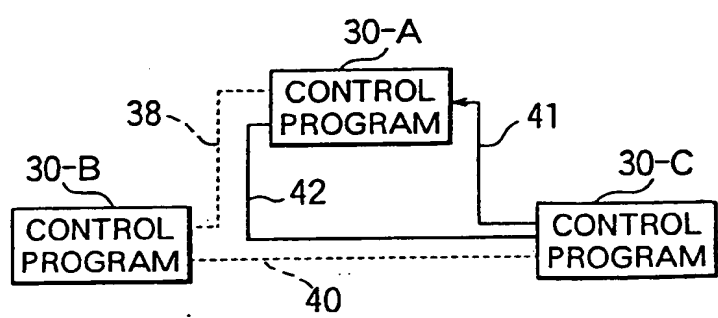


FIG. 7 E

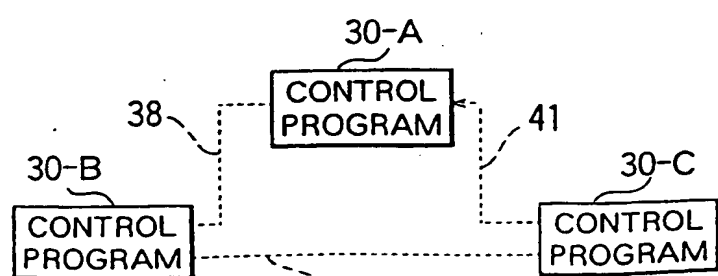


FIG. 8A

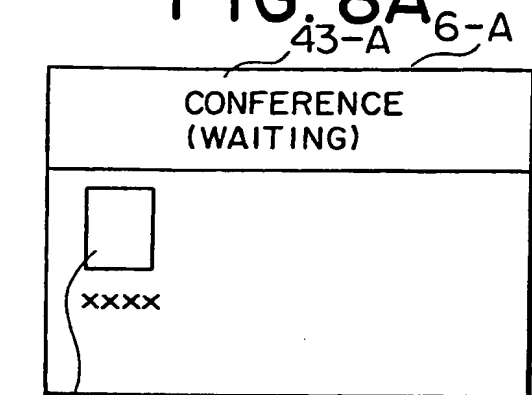


FIG. 8B

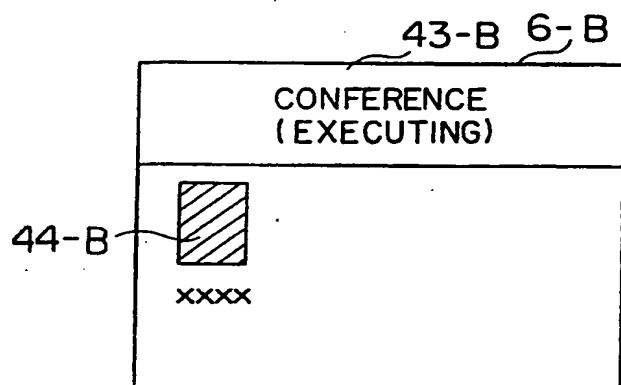
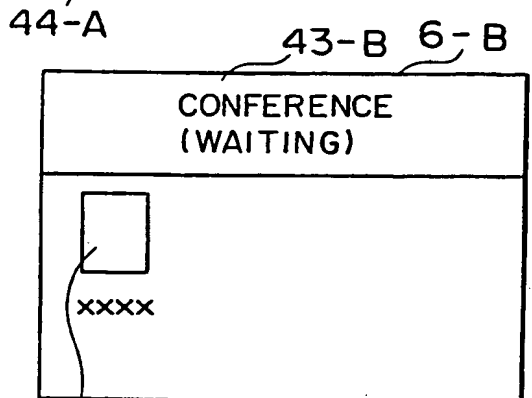
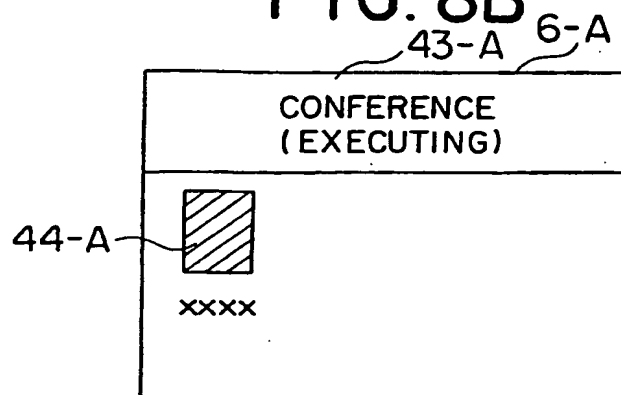


FIG. 8C

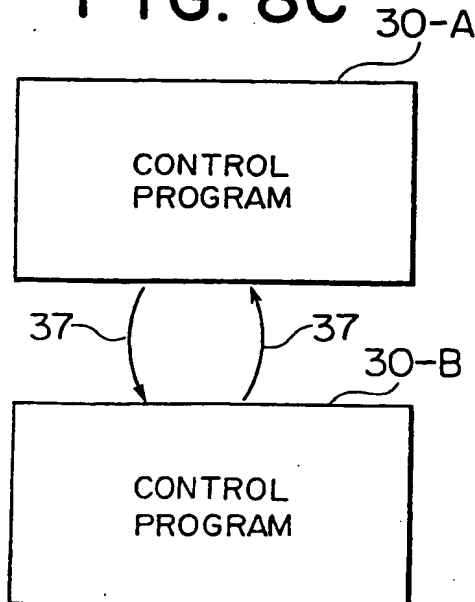


FIG. 8D

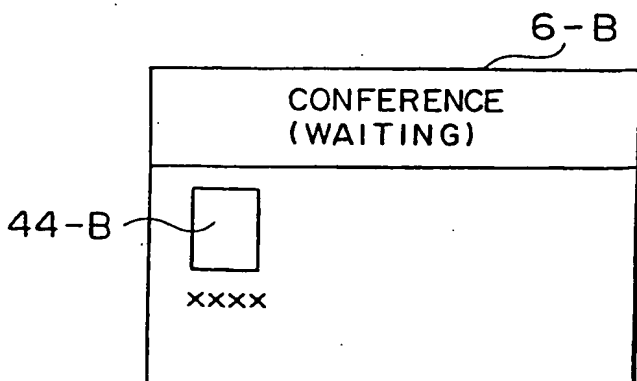
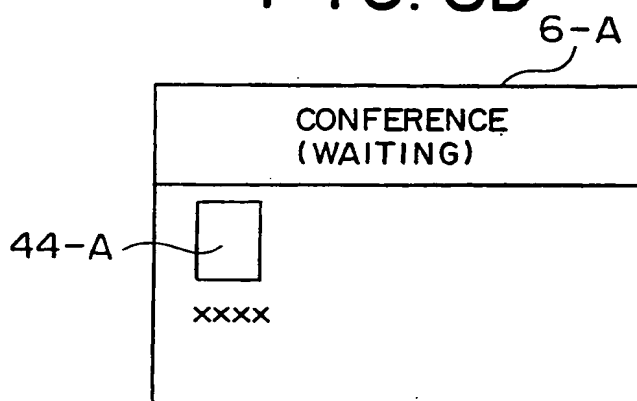


FIG. 9A

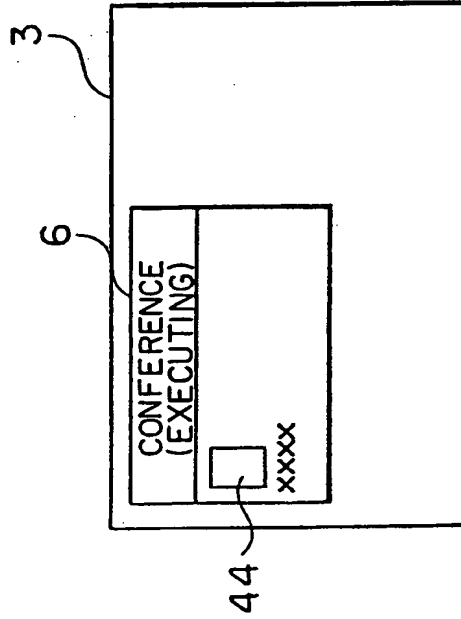
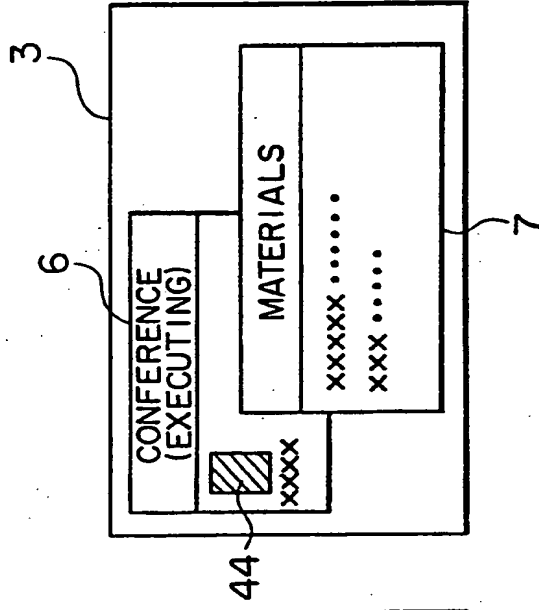


FIG. 9B



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FIG. 10A

50 TITLE : xxxxxx ...

52 DATE : OCTOBER 10, 1990 AM. 10:00~10:30

54 PARTICI- : x, xxxxx x, xxxx x, xxxx
PANTS

56 MATERIAL : xxxxxxxx, xxxxxxxx

FIG. 10B

50 TITLE : xxxxxx ...

52 DATE : OCT. 10, 1990 AM. 10:00~10:30

54 PARTICI- : x, xxxxxx x, xxxxx x, xxxx
PANTS

56 MATERIAL : xxxx



58

FIG. 10C

50 TITLE : xxxxxx

52 DATE : xxx xx, xxxx xx xx:xx~xx:xx

54 PARTICIPANTS: x, xxxx x, xxxxx x, xxxxx

60 MATERIAL IN USE : xxxxxx

62 RECEIVED : xxxxxxxx

64 TRANSMITTED : xxxxxx

FIG. 11

70 ☐ xxxxx

QUERY ITEMS	
FROM	. . .
TO	. . .
<input type="checkbox"/>	NAME (TITLE)
<input type="checkbox"/>	ICON
<input type="checkbox"/>	ATTRIBUTE

72 73 74 76 78 3

FIG. 12

70 ☐ xxxxx

QUERY ITEMS	
FROM	xx. xx. xx
TO	xx. xx. xx
<input checked="" type="checkbox"/>	NAME (TITLE)
<input type="checkbox"/>	ICON
<input type="checkbox"/>	ATTRIBUTE

72 7-1 3

NAME OF THE WORK	
<u>OCT. 10, 1990</u>	
•	xxxxxxxxxxxxxxxx
•	xxxxxxx
•	xxxxxxxxxx
	⋮

80 82

FIG. 13

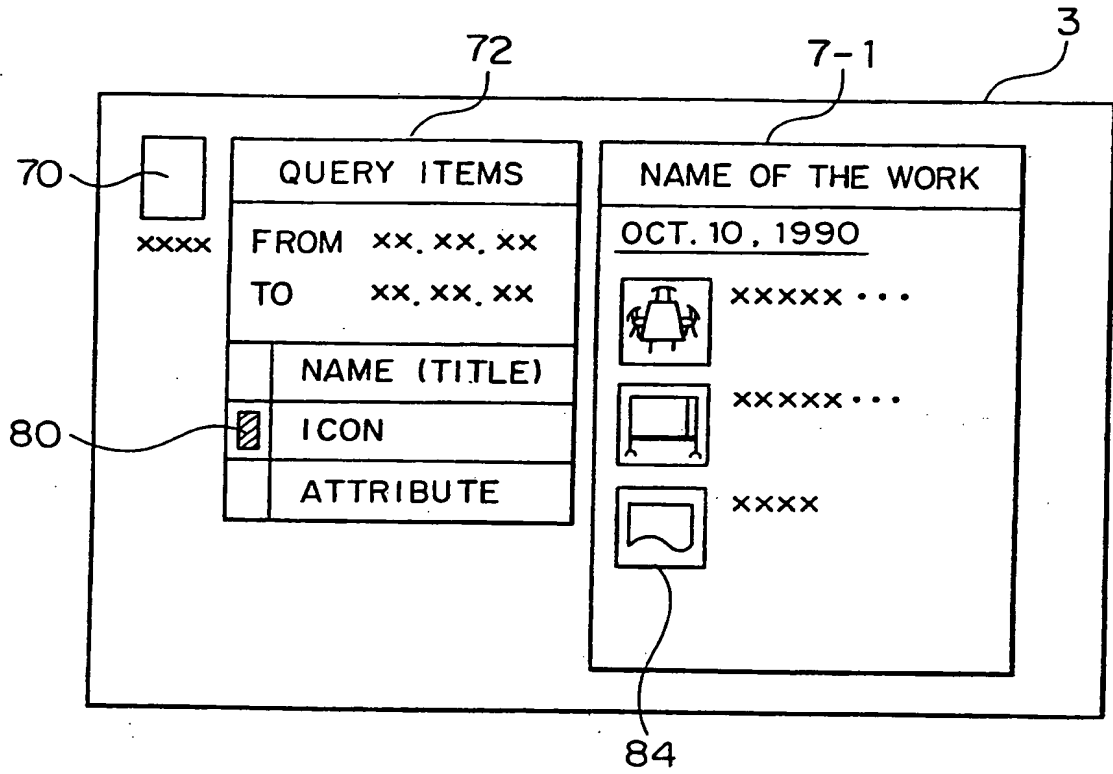
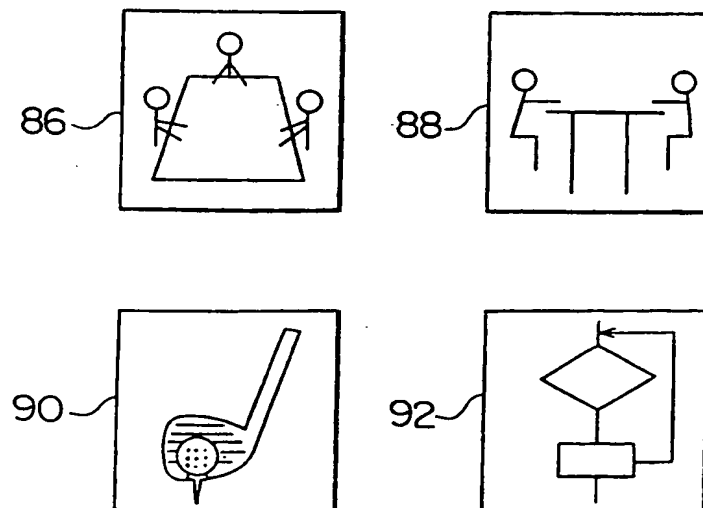


FIG. 14



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C

FIG. 15

72

7-1

3

70

xxxx

QUERY ITEMS	
FROM	xx.xx.xx
TO	xx.xx.xx
<input type="checkbox"/>	NAME (TITLE)
<input type="checkbox"/>	ICON
<input checked="" type="checkbox"/>	ATTRIBUTE

80

NAME OF THE WORK	
<u>OCT. 10, 1990</u>	
• xxxxxxxx ...	} 82 94
9:00 ~ 10:00	
x, xxxx	
x, xxxx	
• xxxxxxxxxxxx ...	
11:00 12:00	
x, xxxx	
x, xxxx	
x, xxxx	

FIG. 16

72

7-1

3

70

xxxx

<input checked="" type="checkbox"/>	NAME (TITLE)
<input type="checkbox"/>	ICON
<input type="checkbox"/>	ATTRIBUTE

80

NAME OF THE WORK	
<u>OCT. 10, 1990</u>	
• xxxxxxxxxxxx	
• xxxxxxxx	
• xxxxxxxx	
• xxxxxxxx	

96

FIG. 17

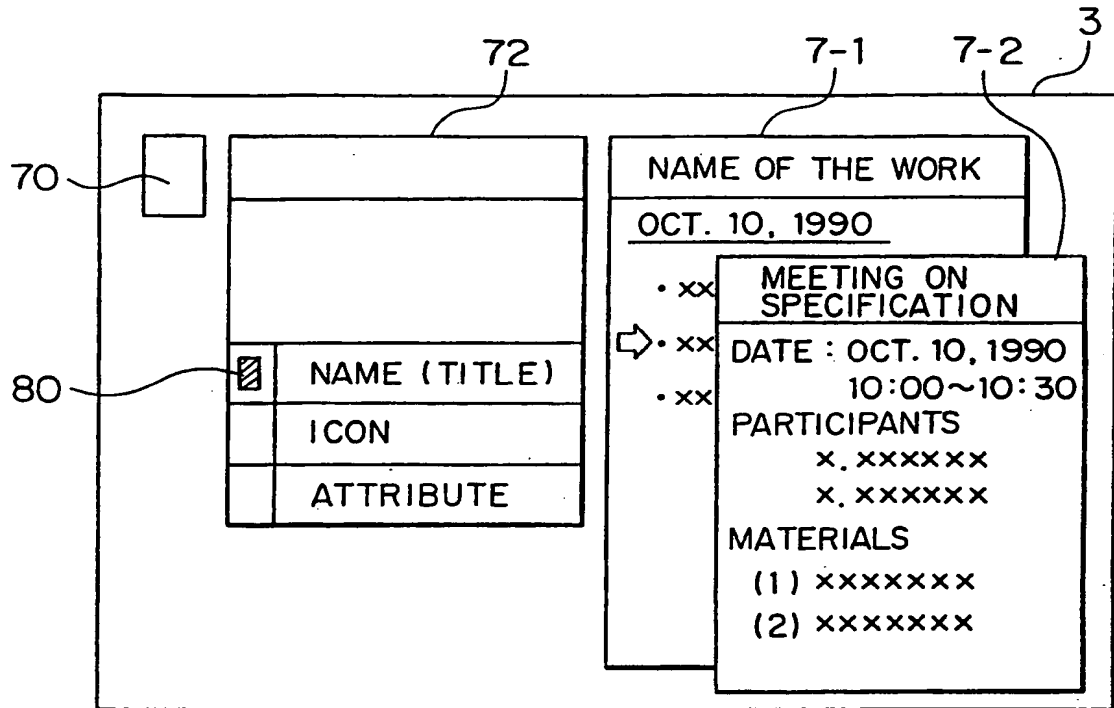


FIG. 18

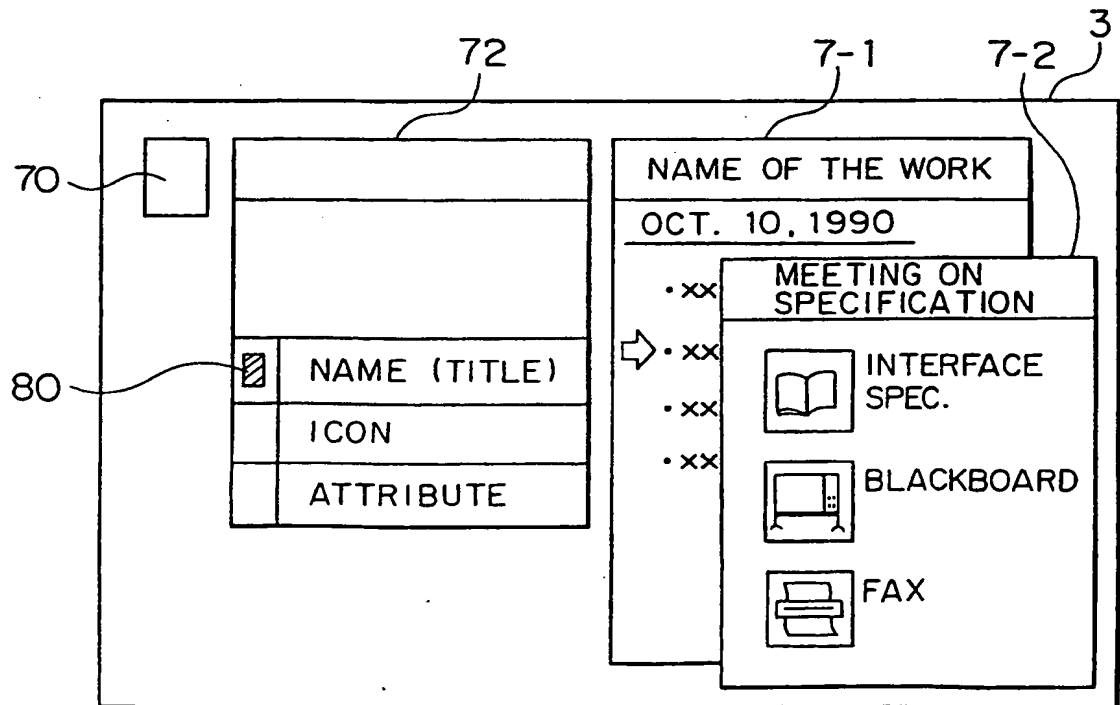


FIG. 19A

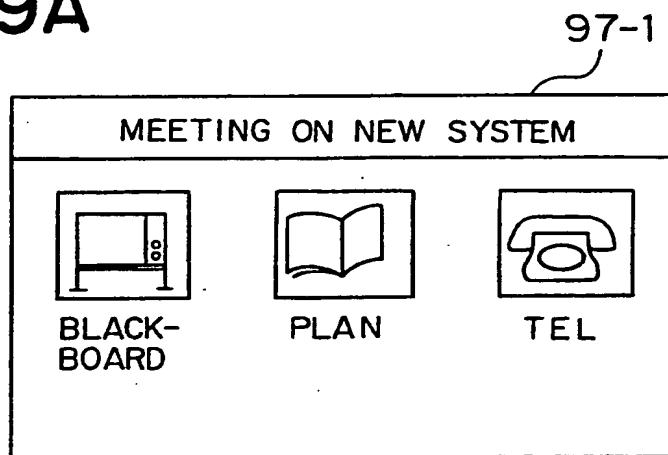


FIG. 19B

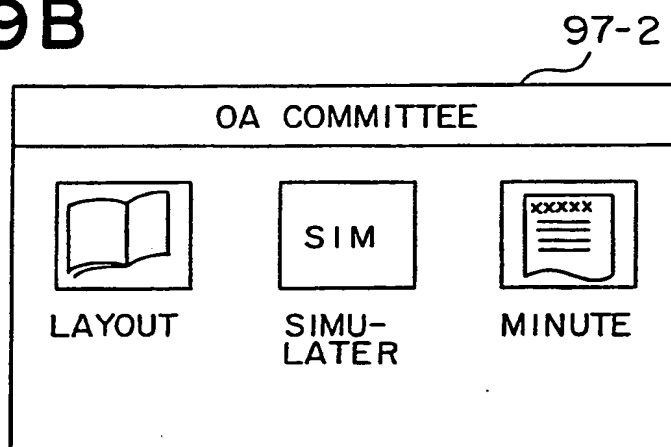


FIG. 20

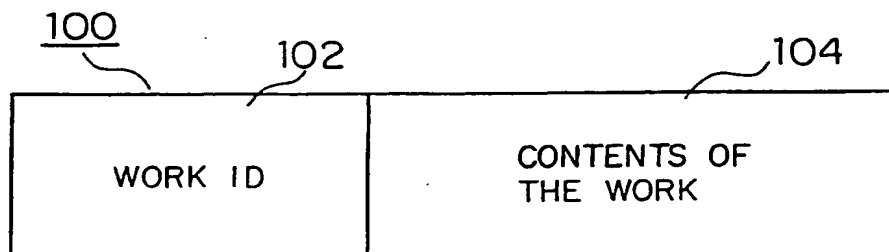


FIG. 21 A

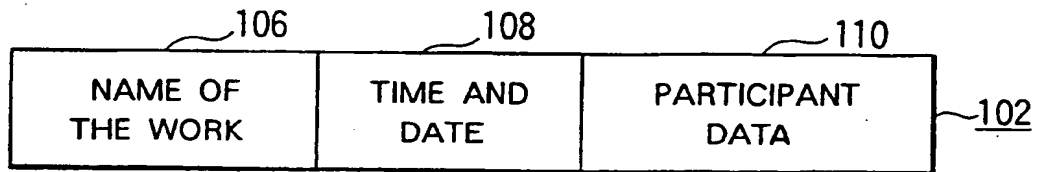


FIG. 21 B

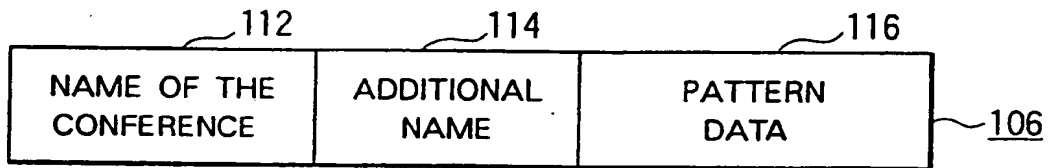


FIG. 21 C

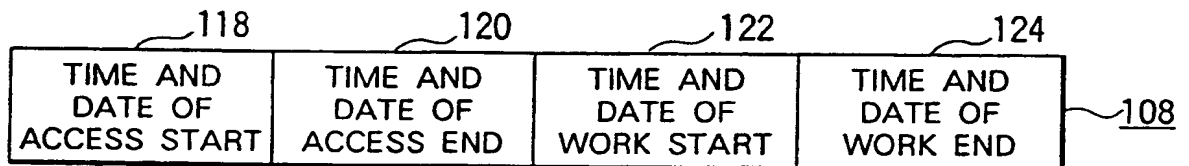


FIG. 21 D

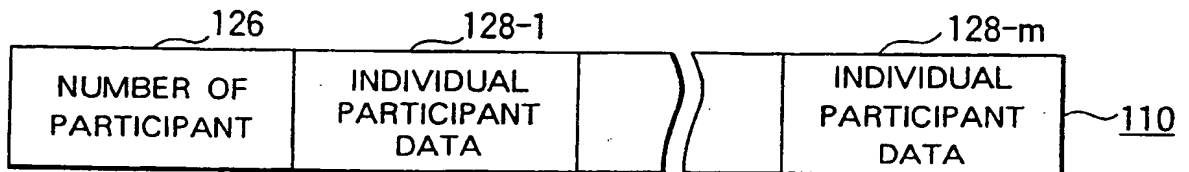
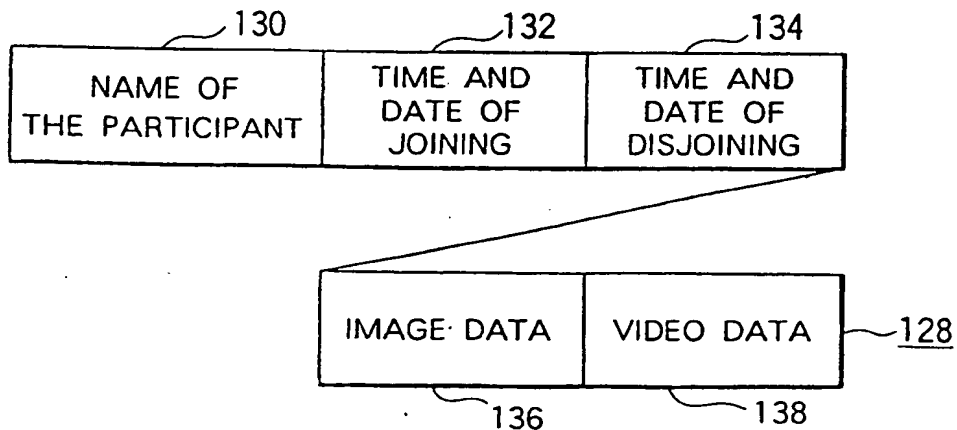


FIG. 21 E



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FIG. 22 A

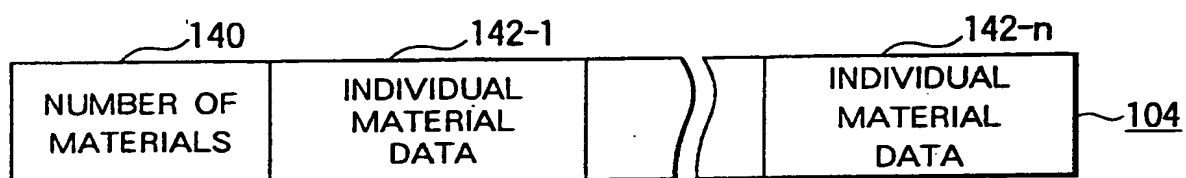
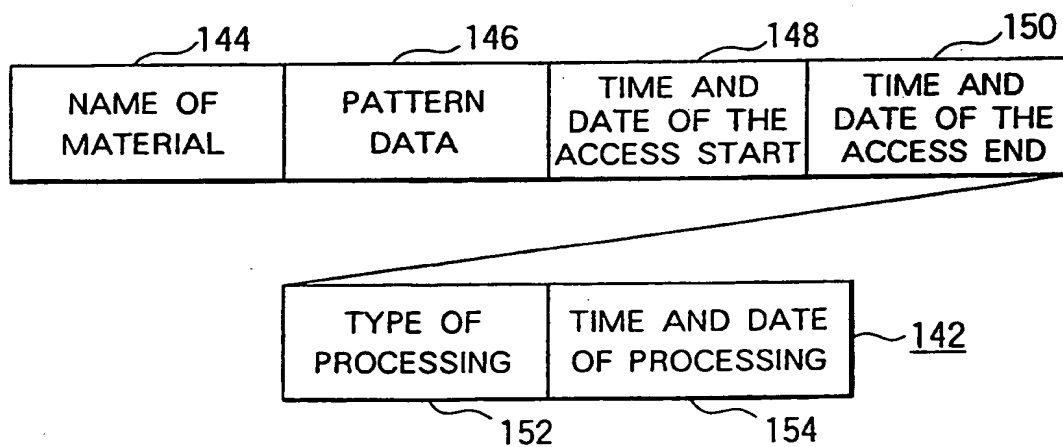


FIG. 22 B



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FIG. 23

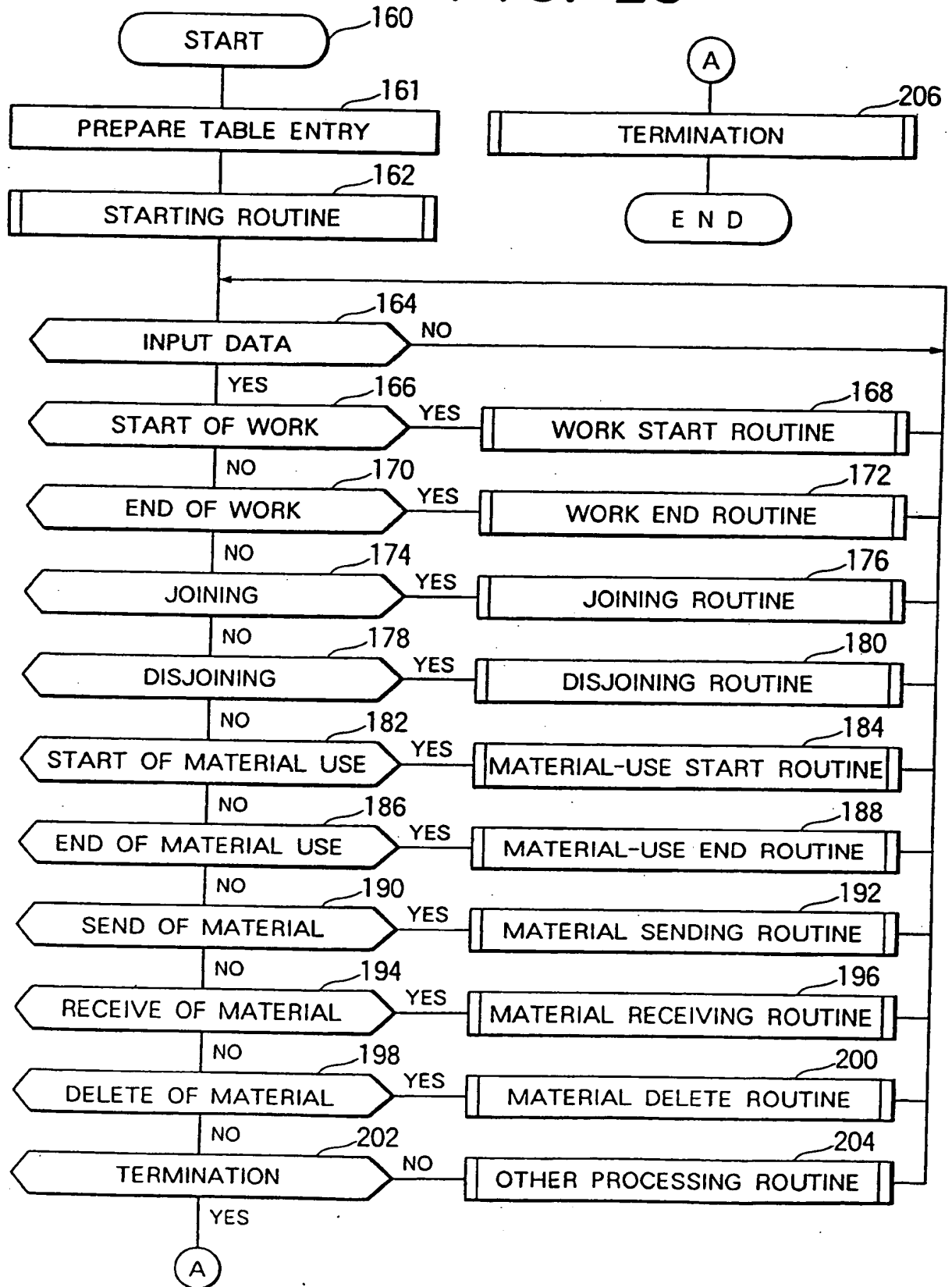


FIG. 24

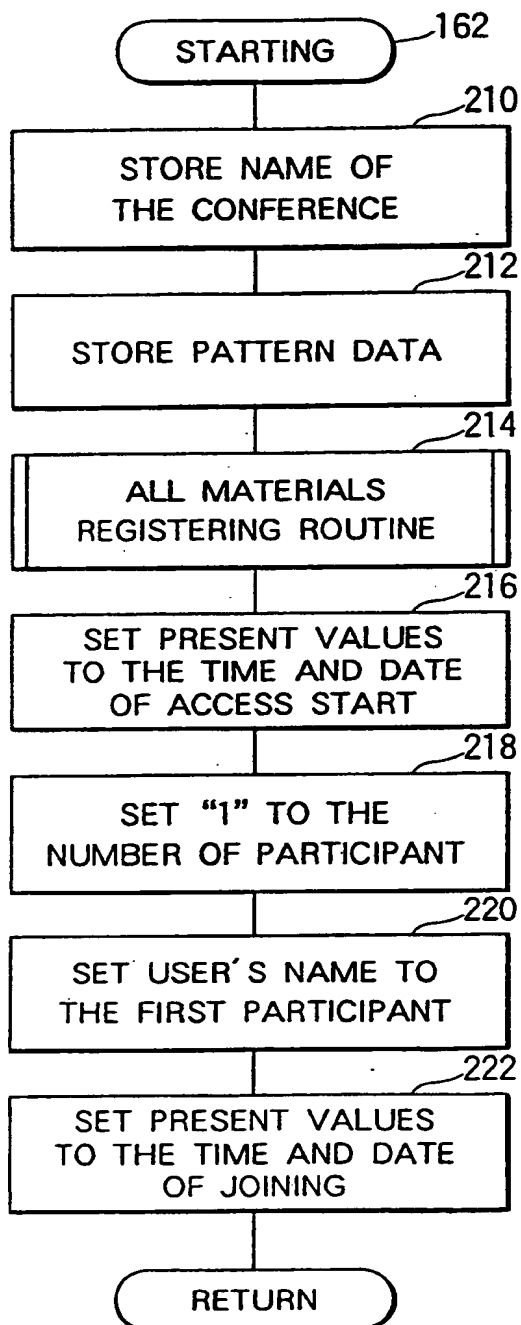


FIG. 25

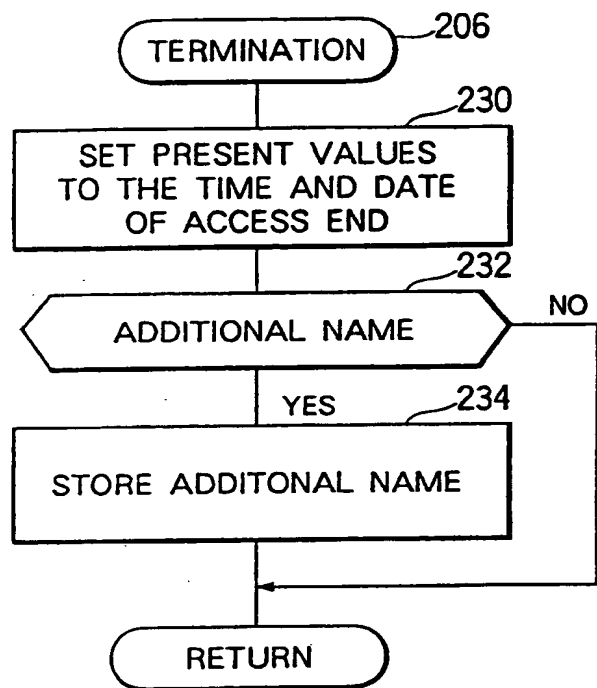
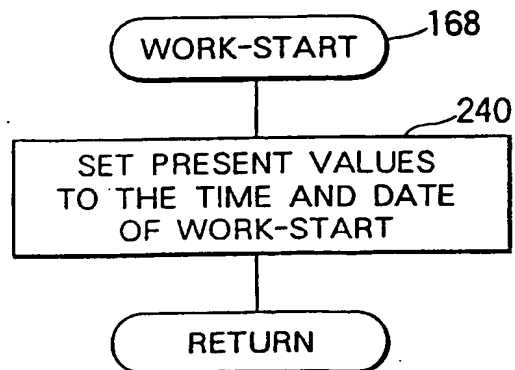


FIG. 26



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FIG. 27

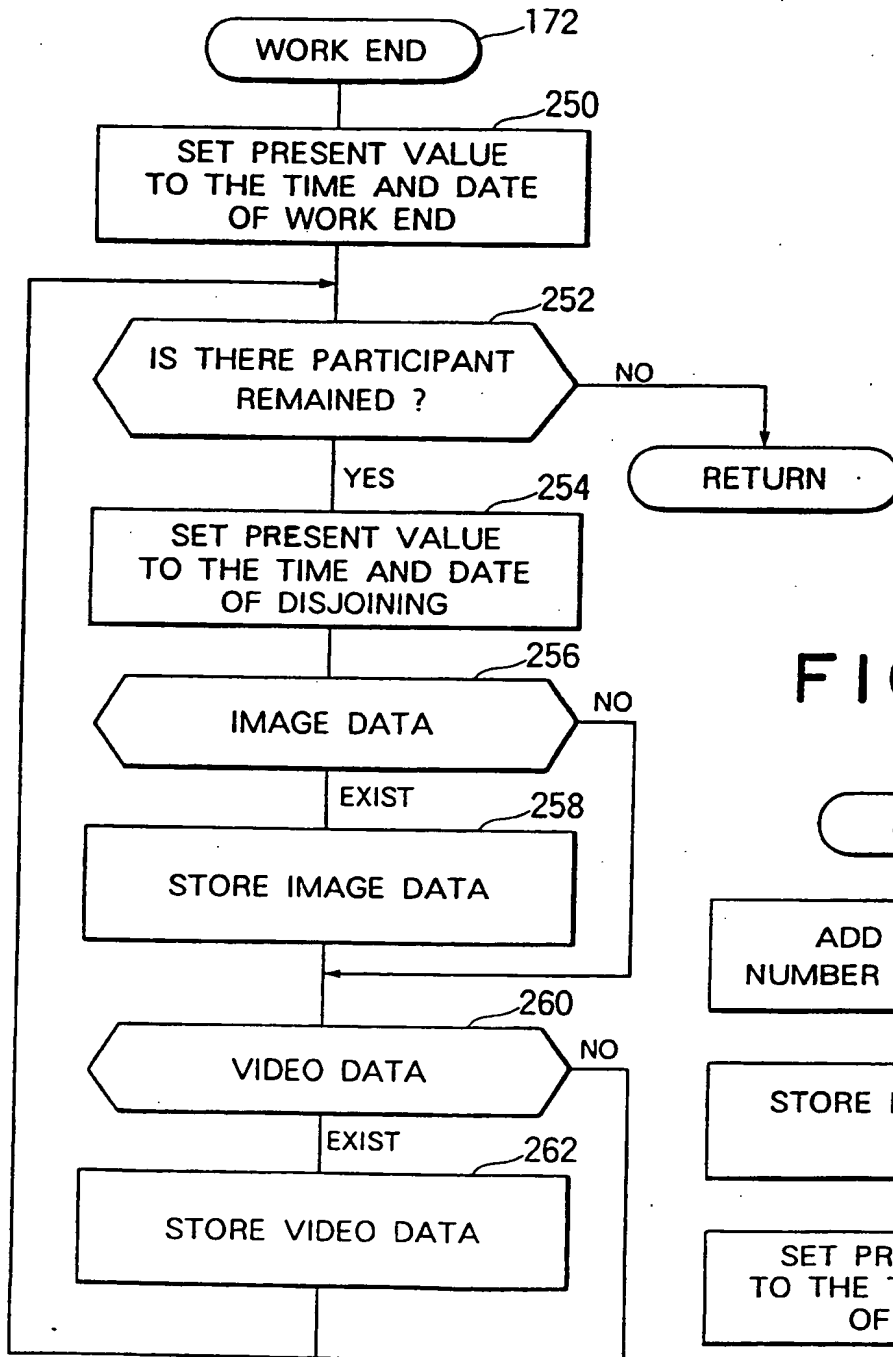


FIG. 28

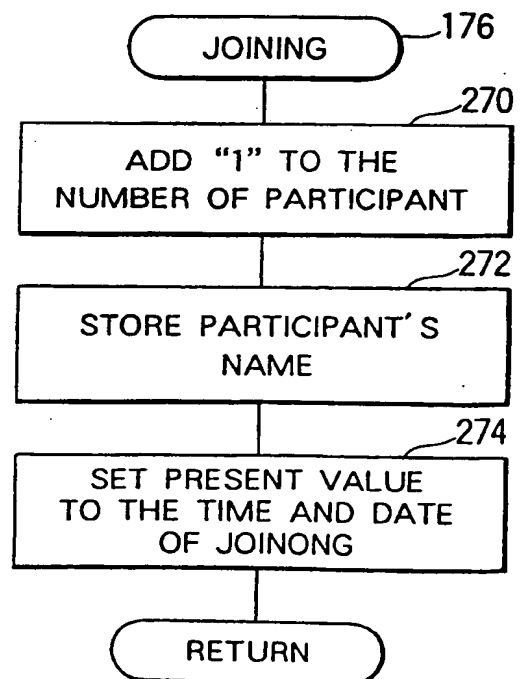


FIG. 29

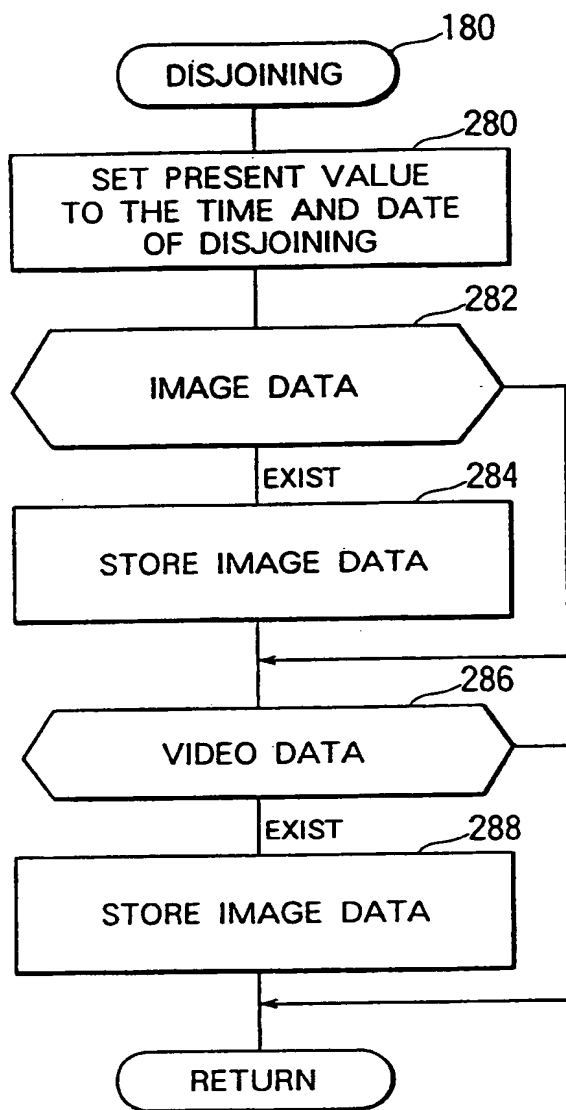


FIG. 31

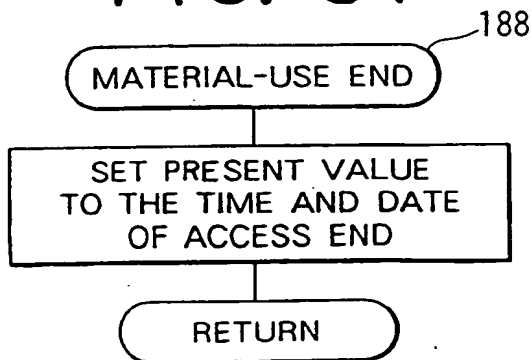


FIG. 30

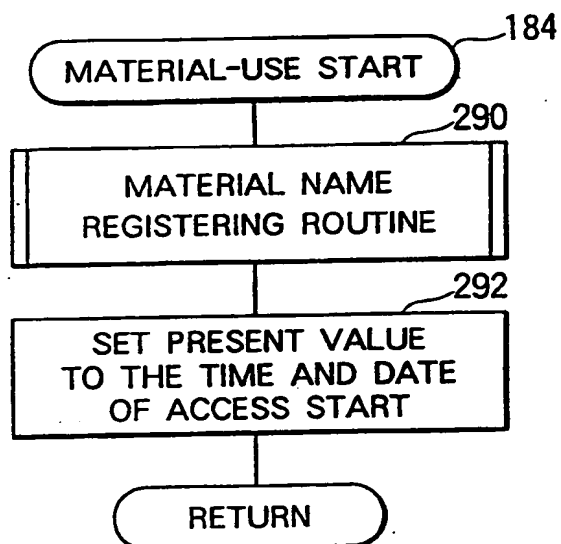
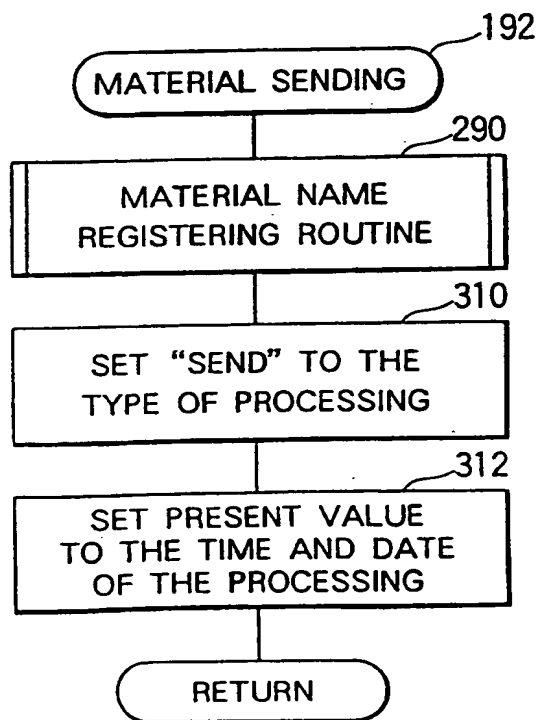


FIG. 32



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FIG. 33

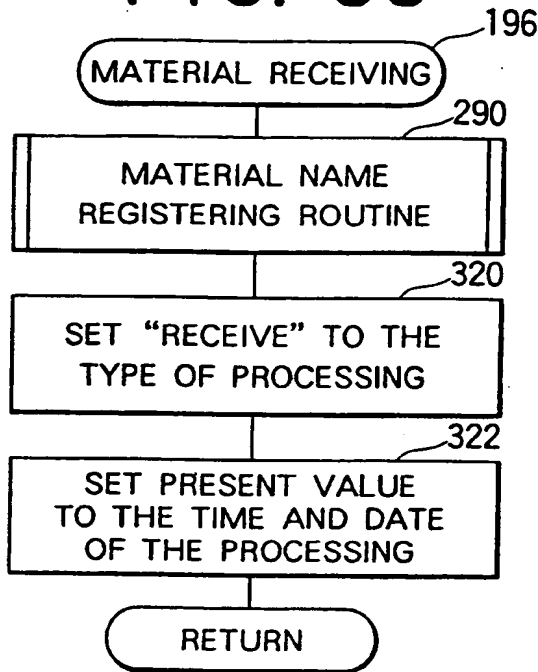


FIG. 34

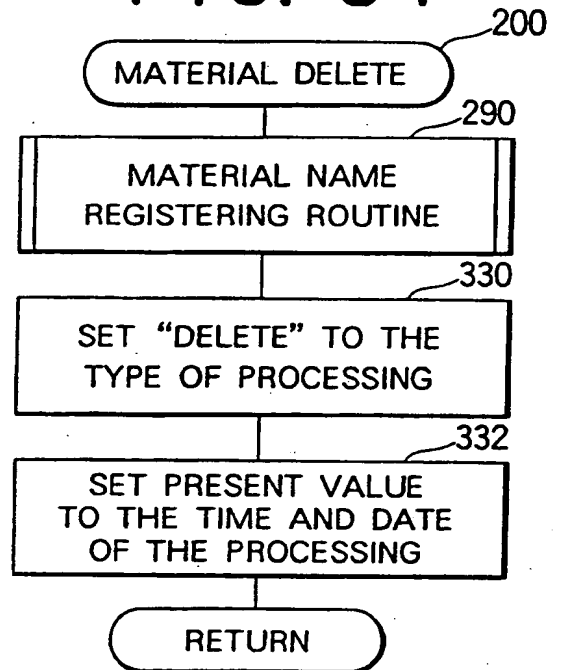


FIG. 35

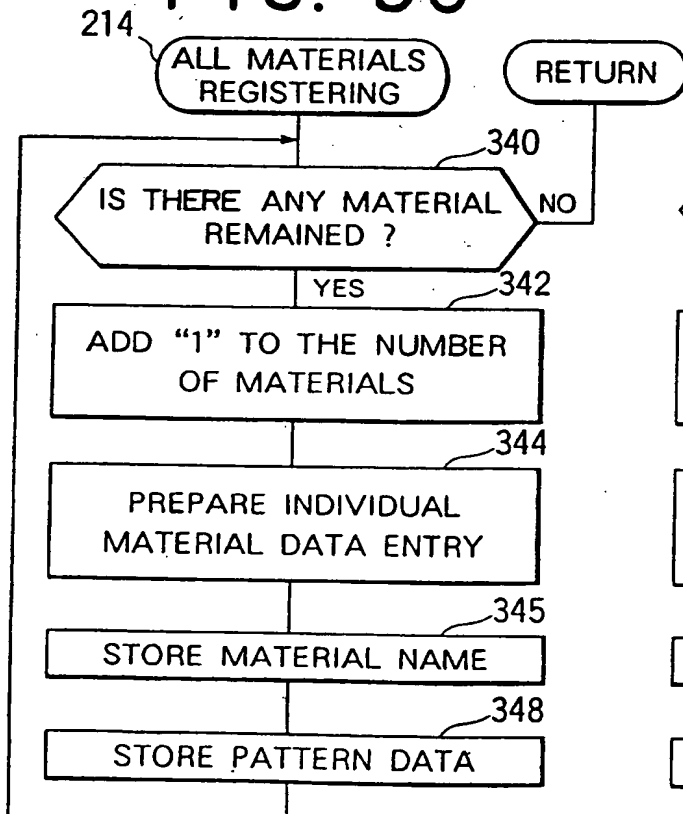
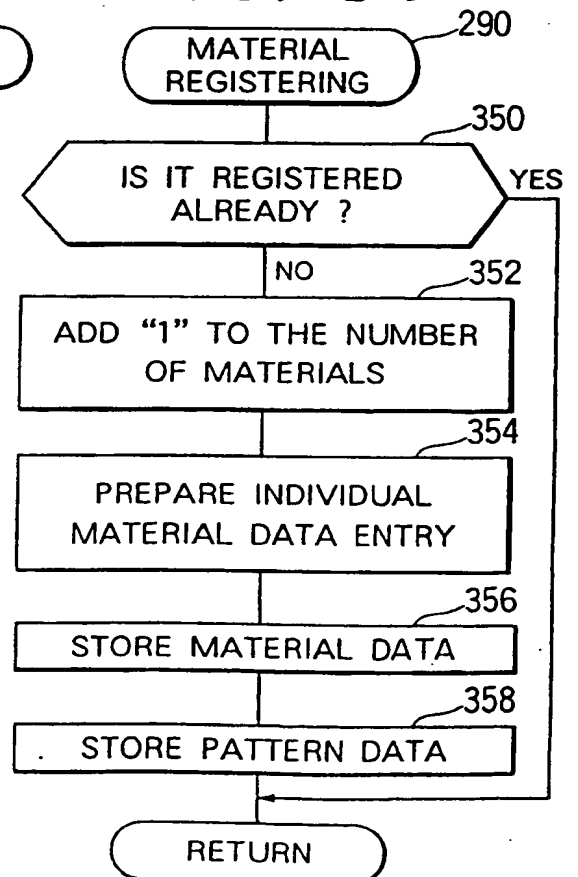


FIG. 36



- 1 -

METHOD AND SYSTEM FOR STORING AND
RETRIEVING COLLABORATIVELY PROCESSED INFORMATION

1

The present invention relates to a method and system for storing and retrieving collaboratively processed information, and more particularly to a method of storing collaboratively processed information, in which information indicative of the matter or content of execution of a group work held by users is recorded automatically in a database at each execution of a collaborative information process preparatory to information retrieval in the future pertinent to the group work, to a method of retrieving materials pertinent to the group work, and to a system for carrying out these methods, the methods and system being intended for a computer-based remote conference system.

Among conventional collaborative information processing systems such as computer-aided remote conference systems, a system which automatically records the matter or content of a group work for each individual user has not been reported.

In regard to an electronic mail system which is one form of information processing systems of a file transfer type, several mail search methods have been proposed in the past.

For example, Japanese Patent Laid-Open JP-A-64-13836 describes a method of sorting mails on tree,

1 Japanese Patent Laid-Open JP-A-1-259451 describes a
method of appending icons to mails for the enhanced
visualization, Japanese Patent Laid-Open JP-A-1-261723
describes a method of pictorial disclosure of the
5 matter, and Japanese Patent Laid-Open JP-A-1-261775
describes a method of appending proper document names.

However, these prior arts do not disclose
techniques which are conceivably effective for the
sorting of materials used in remote conference systems.
10 Moreover, these prior arts do not have effective
suggestions on the application of the above-mentioned
electronic mail search method to a conference system by
which users exchange information on a real time basis
and a collaborative information processing system which
15 are the aims of the present invention.

Up to date, no one has unveiled a hint of
distinguishing automatically the matters of diverse
group works held in a remote conference system and
recording automatically the matter of the works. In
20 order to review the matter of a conference afterward
based on the conventional scheme of information
retrieval, it is necessary for each user to describe the
matter of the conference or group work as a document
intended for retrieval in the same manner as ordinary
25 documents, and register the document, with a proper key
word being affixed thereto, to a database.

1

The present invention may this seek toto
provide a method and system for storing collaboratively
processed information capable of automatically storing
5 information pertinent to a group work in a database
without imposing an excessive burden on the user for the
subsequent entry of ancillary data for information
retrieval.

The present invention may also seek to
10 provide a method of storing collaboratively processed
information, a method of information retrieval and a
system for carrying out these methods, all intended to
allow easy access to materials and data which have been
referenced or created in a group work (conference), as
15 well as the outline of the group work (conference) that
has been held by utilization of a collaborative informa-
tion processing system represented by a remote
conference system.

Therefore,
20 according to one feature of the present invention, a
conference system or collaborative information pro-
cessing system including multiple terminal units
(including computers and workstations) connected through
communication lines comprises a database (history table)
25 for storing information relating to a group work refe-
renced or created by individual users, in which each
terminal unit has a control program for controlling the
execution of a group work and it runs the program at

1 each event such as the commencement and completion of a
group work, joining and disjoining of a user with the
group work, or the like thereby to create information
records indicative of the contents of these events, and
5 register the information records in the form of a search
table in the database.

The collaborative information processing
system according to one feature of the present invention
comprises a plurality of terminal units interconnected
10 through a network, with each terminal unit being made up
of a microprocessor incorporating a control program for
controlling the execution of various application pro-
grams and the communication with other terminal units,
input/output devices such as a display panel and key-
15 board, and preferably a telephone set, and the system is
designed to enable individual users in remote places to
make reference to a material which is displayed equally
on a display screen of every terminal unit and parti-
cipate in a conference and/or a group work for creating
20 materials through the telephone set under control of the
control program.

According to one aspect of the invention, a
method of storing collaboratively processed information
implemented by a computer network system including the
25 above-mentioned terminal units comprises: a step of
starting a group work by connecting control programs of
multiple terminal units through logical communication
paths, a step implemented by each control program, of

1 generating identification data of the group work and
work matter data pertinent to the situation of the work
during a time band recognized to be midway of the group
work, and a step of storing the work identification data
5 and work matter data in association with each other in a
database.

The group work identification data includes
the name of the group work or conference, the date and
time when the group work is held, and the names of
10 participants of the group work, for example. This data
may further includes information for work identification
specified arbitrarily by users. The work matter data
includes the names of materials referenced in the group
work, and preferably information indicative of when and
15 how each material is treated, for example.

According to the present invention, informa-
tion pertinent to a group work of users is stored
automatically in the database of terminal units, and as
a result, it becomes possible for each user to find
20 afterward an intended material by searching the database
for the records of the group work which has been held in
the past.

The foregoing and other desired aims, advantages,
the manner of operation, and novel features of the
25 present invention will be understood from the following
detailed description taken in conjunction with the
accompanying drawings.

1 In the drawings

Fig. 1 is a diagram showing an external view of a conference system which is an embodiment of the collaborative information processing system according to
5 the present invention;

Fig. 2 is a diagram used to explain the typical affair of conference in which information is stored and retrieved according to the present invention;

Fig. 3 is a diagram showing an example of the
10 menu of control commands;

Fig. 4 is a block diagram showing, as an example, the structure of terminal units (workstations) which form a conference system;

Fig. 5 is a diagram showing, as an example, a
15 software configuration in each terminal unit;

Fig. 6 is a diagram used to explain the linkage among control programs when a conference system is formed by multiple terminal units;

Figs. 7A - 7E are diagrams explaining a method
20 of altering the control program linkage at the start and termination of a conference and changes in the action of conference;

Figs. 8A - 8D are diagrams used to explain the transition between the individual working state and the
25 group working state in the conference system;

Figs. 9A and 9B are diagrams used to explain the use of materials in the conference system;

1 Figs. 10A - 10C are diagrams used to explain
the display of the search result based on the inventive
work information;

5 Fig. 11 is a diagram showing an example of a
display screen for requesting the work information
search;

Fig. 12 is a diagram showing an example of a
display screen for names of work information;

10 Fig. 13 is a diagram showing an example of a
display screen for icons of work information;

Fig. 14 is a diagram showing an example of
icons which denote works;

Fig. 15 is a diagram showing an example of a
display screen for work information having attributes;

15 Fig. 16 is a diagram showing an example of a
display screen for requesting detailed information
pertinent to a specific work;

20 Fig. 17 is a diagram showing an example of a
display screen for detailed information of a specific
work;

Fig. 18 is a diagram showing an example of a
display screen for to working environment pertinent to a
specified work;

25 Figs. 19A and 19B are diagrams showing, as an
example, works and corresponding fields of group work;

Fig. 20 is a diagram showing a format of the
work information table which is stored in the database
of each terminal unit;

1 Figs. 21A - 21E are diagrams used to explain
the format of the work identification data table;

 Figs. 22A and 22B are diagrams used to explain
the format of the work matter data table;

5 Fig. 23 is a flowchart of the main program
according to the present invention;

 Fig. 24 is a flowchart showing in detail the
starting routine 162 in Fig. 23;

 Fig. 25 is a flowchart showing in detail the
10 termination routine 206 in Fig. 23;

 Fig. 26 is a flowchart showing in detail the
work start routine 168 in Fig. 23;

 Fig. 27 is a flowchart showing in detail the
work end routine 172 in Fig. 23;

15 Fig. 28 is a flowchart showing in detail the
joining routine 176 in Fig. 23;

 Fig. 29 is a flowchart showing in detail the
disjoining routine 180 in Fig. 23;

 Fig. 30 is a flowchart showing in detail the
20 material use starting routine 184 in Fig. 23;

 Fig. 31 is a flowchart showing in detail the
material use termination routine 188 in Fig. 23;

 Fig. 32 is a flowchart showing in detail the
material transmission routine 192 in Fig. 23;

25 Fig. 33 is a flowchart showing in detail the
material reception routine 196 in Fig. 23;

 Fig. 34 is a flowchart showing in detail the
material deletion routine 200 in Fig. 23;

1 Fig. 35 is a flowchart showing in detail the
entire material registration routine 214 in Fig. 23; and

 Fig. 36 is a flowchart showing in detail the
material name registration routine 290 in Fig. 23.

5

 Description will be made of a conference
system having a function of storing and retrieving
collaboratively processed information as an embodiment
of the collaborative information processing system
10 according to the present invention.

 Fig. 1 is an external view of the inventive
conference system comprised of terminal units (or work
stators) and telephone sets. The system includes input
units 1 (1A, 1B, 1C), computational processing units 2
15 (2A, 2B, 2C) each incorporating a CPU and memory, output
units 3 (3A, 3B, 3C) which are display units for
displaying the result of process, a communication
network 4 which supports data communication among the
processing units, and telephone sets 5 (5A, 5B, 5C)
20 which support voice communication among the conference
participants. The unit sections 1, 2 and 3 will be
called "workstations" in this embodiment.

 The input unit 1 may employ a joy stick,
tablet or the like. Such pointing devices as a mouse
25 and joy stick are useful means for specifying a position
on a display screen of the display unit 3 or selecting
an item in the displayed menu for the branching of

1 action. The output unit 3 may employ an audio output device for handling multi-media information.

For the communication network 4, use of the ISDN (Integrated Services Digital Network) enables the
5 processing unit 2 to have general control of the communication network inclusive of the telephone set 5, and it is advantageous for the management of the facility and fee. It is apparently possible to organize the system by taking separate contracts for a data communication
10 network which links the processing units 2 and a telephone network which links the telephone sets. In this case, the processing unit 2 can operate the telephone set 5 to some extent through the use of the RS-232C interface, for example.

15 In this conference system according to the invention, individual users of the workstations (computer systems) interconnected through the communication network operate their input units 1 and receive visual and acoustic information for their output units 3, as
20 well as exchanging voiced information through the telephone sets 5, thereby to make decisions in the conference or group work or create materials. Information displayed on the output unit is treated with the processing unit thereby to carry out the information
25 processing activity which cannot be accomplished by the speech-based system.

The basic arrangement of this sort of remote conference system is described in detail in U.S. Patent

- 1 Application Serial No. 350850 filed May 12, 1989 based
on Japanese Patent Application No. 63-114636 filed May
13, 1988 and U.S. Patent Application Serial No.
07/614087 filed November 15, 1990 based on Japanese
5 Patent Application No. 01-294983 filed November 15, 1989
by the inventors of the present invention, the contents
of which are incorporated herein by reference.

Although shown in Fig. 1 is a conference held
by three users each using a workstation, the inventive
10 conference system supports a conference for four or more
participants, and even a conference for one participant
is logically possible. The following explains the
functions of conference system by taking an example of a
three-person conference which comprehends the above-
15 mentioned generality.

Fig. 2 shows a typical affair of conference
displayed on the output unit 3. Indicated by 6 is a
conference room window and it can be said to be a cross
section of conference viewed by the participants. Work-
20 stations which constitute the conference system have a
range of support from a work of one person to a work
done by many participants. For a three-person confer-
ence, the conference room window of each person
(workstation) is set to the same conference. Placed in
25 the conference room window 6 are icons R1-R4 which
represent materials of conference and such facilities as
a blackboard in the form of relatively small symbolic
images. Although the conference room window includes

1 other icons such as a personal memo and telephone set in
addition to the above-mentioned resources, they are not
shown in Fig. 2. An icon is selected by a cursor 10
which has its position on the screen controlled by means
5 of a mouse that is a pointing device, so that the
information processing or control operation by use of
the resource corresponding to the selected icon is
carried out.

In the example of Fig. 2, a document which is
10 a conference material (icon R3) is displayed in a docu-
ment window 7, and a blackboard which is a conference
facility (icon R2) is displayed in a blackboard window
8.

When a participant of one workstation takes an
15 operator action to bring a resource in the conference
window 6 to other window 7 or 8, the conference control
program which will be explained later functions to cause
the output units 3 of remaining participants to have the
same change of screen (display of the document window 7
20 and blackboard window 8) in response to the operator
action.

The conference control program propagates the
action taken by any participant in the document window
or blackboard window to workstations of other partici-
25 pants so that a consistent change appears in all perti-
nent windows on the screen 3. Accordingly, when one of
participants moves the cursor in a window, the same
cursor movement takes place in other workstations, and

- 1 all participants can argue on the matter or content of material or edit data by pointing the same position on their screens.

In Fig. 2, indicated by 9 in the blackboard window 8 are pointing objects (POs) which are used by the participants to point the same position in the window. In this embodiment, three participants have assignments of POs 9A-9C of different shapes or different colors. For the identification of PO, the self PO 10 is orange invariably, or the name or initial of a participant is affixed to one's PO, for example.

Fig. 3 shows an example of the menu 11 of conference execution commands which are used to start the conference or alter the attribute of conference 15 (e.g., the number of participants). In this embodiment, the conference execution commands are "join" 12, "admit" 13, "disjoin" 14 and "end" 15.

When the "join" command 12 is selected, a list of conference 16 is displayed for the next menu. An 20 operator selects the name of a conference which he or she intends to join, and the preparatory operation for the participation to the conference starts. With the "join" command or a conference name being selected, each user enters the personal data (name and/or identification number) in response to the prompt made by the 25 control program. The personal data is used as the participant name data which is an item of collaboratively processed information as will be explained later, and

1 also used for verifying the personal legitimacy of the
access to the conference system. The personal data may
be substituted by a record on a magnetic card or IC card
which is verified at the start-up of the workstation or
5 in response to the request by the control program.

When the "admit" command 13 is selected, a
list of admitted participants 17 is displayed as a menu
on the screen, and when some one in the list is selected
with the cursor (or when some one who is not registered
10 in the list is added), the workstation of that person is
newly included in the conference (conference system)
which is already active. Accordingly, a person who has
received the introduction to a conference through the
telephone or the like and expressed the will of partici-
15 pation to the conference by selecting the "join" command
12 on the workstation can join in the conference when a
participant of a workstation which is already included
in the conference system enters the "admit" command 13,
and by taking this procedure the number of conference
20 participants can be increased.

The conference name list 16 and admitted
participant list 17 are produced from information in a
conference database 18 which stores various data related
to conferences. The search table (group work database)
25 of collaboratively processed information created accord-
ing to the invention is recorded in part of a memory
(file) in which the database 18 is formed.

1 Any participant can pull out of the conference
at a midway point by selecting the "disjoin" command 14.
This result in a scale-down of the conference (reduction
in the number of conference participants). When one of
5 participants selects the "end" command 15, the conference is terminated. As a result of entry of the
"disjoin" command 14 or "end" command 15, the workstation which pulls out of the conference has its conference window turning to the field of individual work.

10 Fig. 4 is a block diagram showing the basic arrangement of the workstation 2. Indicated by 23 is a memory unit for storing various kinds of programs and data, and 19 is a central processing unit (CPU) which executes the data processing in accordance with a
15 program read out of the memory unit 23. The CPU 19 issues commands to a bit map processor (BMP) 20, which then controls display on the output unit 3. Specifically, the BMP 20 responds to a command from the CPU 19 to rewrite a frame memory 21 which stores the content of
20 display as image data. A numeral 22 denotes a display controller which transfers the contents of the frame memory 21 to the output unit 3. A numeral 24 denotes a keyboard driver for transferring character codes entered through the keyboard, which is one of the input unit 1,
25 into a register 26, and 25 is a mouse driver for transferring data entered through the mouse, which is one of the input unit 1, into a register 27. In the present invention, certain events occurring during the execution

1 of a collaborative information processing are memorized,
with the date and time being affixed thereto, and the
date and time of event are provided by the timer
function which is a basic function of the CPU 19.

5 This embodiment employs, as the communication
system among workstations and telephone sets, the PBX
(Private Branch Exchange) 29 which provides the ISDN
interference that enables voice and data communication
over a single line. Each workstation represented by the
10 CPU 19 and each telephone set are connected to the PBX
29 through the communication interference unit 28, and
it has mutual communication with counterpart devices by
way of the PBX 29. It is also possible to link only
telephone sets to the exchange, with workstations being
15 interconnected separately through other network such as
the LAN (Local Area Network) or packet exchange, as
mentioned previously.

Fig. 5 shows the basic organization of soft-
ware established in each workstation 2 for accomplishing
20 the conference system. In each workstation, various
kinds of programs executed by the CPU 19 and interface
functions for the input unit 1 and output unit 3 are
provided by a window system 36. A program receives a
data, which is entered on the input unit 1, through the
25 window system 36, and transfers a display command to the
window system so that the result of execution of data
processing is displayed on the output unit 3.

1 Indicated by 30 is a conference control
program for forming the field of a conference in a
workstation 2. Conference control programs 30 (30')
placed in multiple workstations in network linkage are
5 connected through logical communication paths, so that a
command entered on any one workstation is transferred to
other workstations by use of the function of the confer-
ence control programs, thereby forming a field of
conference by which the same data processing result can
10 be referenced on these workstations.

 Data visualized for the conference partici-
pants is produced and displayed by interaction programs
(application programs) 34 and utility programs 35. The
interaction programs 34 include a document editing pro-
15 gram, table editing program and blackboard program, for
example. In multiple workstations, the same interaction
programs 34 are run in unison under control of their
conference control programs 30, whereby all participants
can view the same display.

20 The utility programs 35 are intended to
enhance the easiness of use of the interaction programs
34 for group works, and the programs 35 include a PO
control program for displaying a PO (Pointing Object) in
the window used by a interaction program 34, for
25 example. Using the PO control program, even in the case
of including an existing application program as one of
interaction programs 34, enables all workstations to

1 display their POs which point the same position in the
window where the application program is operating.

The conference control program 30 is made up
of an input virtualizing module 31, a communication
5 control module 32, and a virtual user interference
module 33.

According to the invention, input data or
input command (will be termed generically "input data")
which has been entered by a participant on the input
10 unit 1 is received by the input virtualizing module 31
through the window system 36, and it is converted to the
specified data format (virtual input data), with a
header including such information as participant
identifier being affixed thereto, used in the conference
15 system. The virtual input data produced by the input
virtualizing module 31 is transferred to the
communication control module 32.

One of roles of the communication control
module 32 is to have communication with other conference
20 control program 30 thereby to propagate input data
created by one workstation to the interaction program 25
which is under control of the other conference control
program 21 or to the utility program 35. Another role
of the conference control program 32 is to transfer
25 virtual input data entered on the input unit 1 and
received from other workstation to the interaction
program 34 and utility program 35 under control of the
conference control program 30 of the self workstation

1 through the virtual user interference module 33, and to
transfer the virtual input data to a group work database
producing program 160 which will be explained later.

The virtual user interference module 33
5 supplies the received virtual input data to an
appropriate interaction program 34 or utility program 35
without altering the format or by converting the data
back to the original input data format.

The interaction program 34 and utility program
10 35 implement data processing for the input data which
has been received through the above-mentioned procedure,
and deliver the result of process to the output unit 3
by way of the window system 36. It is possible for a
conference control program 30 to have more than one
15 interaction program 34 and utility program 35. For
example, multiple functions such as document editing and
table calculation, or PO display and hand-written curve
display can be used concurrently in one conference.

Next, the method of forming logical communica-
20 tion paths 37 among three conference control program 30-
A, 30-B and 30-C will be explained with reference to
Fig. 6. Such devices as the input unit 1 and output
unit 3 are not shown in the figure for the simplicity of
explanation.

25 The conference control programs 30 which
constitute a conference system have two logical communi-
cation paths 37 (37R, 37T) each. One path 37T is a
sending path for transmitting the virtual input data to

1 other conference control program 30, and another path
37R is a receiving path for receiving the virtual input
data from other conference control program 30. By
connecting the sending path of one program 30 to the
5 receiving path of another program 30, all conference
control programs 30 can be linked through a ring logical
communication path. Input data entered on the input
unit 1 of one workstation is propagated to all
conference control programs 30 along the ring logical
10 communication path 37.

Figs. 7A-7E show the procedure of operating a
conference system by linking these conference control
programs 30 (30-A, 30-B, 30-C) through the logical
communication paths 37. Users who operate these
15 workstations are represented by A, B and C.

Fig. 7A shows the system status after the
users A, B and C have displayed the conference room
window 6 on their workstations. At this stage, all
control programs 30-A, 30-B and 30-C are running
20 independently.

Fig. 7B shows that the user A selects the
"admit" command 13 in the conference execution command
menu 11 to admit the user B to join in the conference
and the user B selects the "join" command 12 in the
25 conference execution command menu 11 to request the
participation to the conference, and that the field of
conference for the participants A and B is formed. A
logical communication path 38 is established from the

1 conference control program 30-A to 30-B and another
logical communication path 38 is established in the
opposite direction.

Fig. 7C shows that the user A selects the
5 "admit" command 13 in the conference execution command
menu 11 to admit the user C to join in the conference
and the user C selects the "join" command 12 in the
conference execution command menu 11 to request the
participation to the conference, and that the field of
10 conference for the participants A, B and C is formed.
In this case, the logical communication path 39 from the
control program 30-B to 30-A is disconnected, and a
logical communication paths 40 and 41 are established
from control program 30-B to 30-C and from 30-C to 30-A,
15 respectively.

Fig. 7D shows that the user B selects the
"disjoin" command 14 in the conference execution command
menu 11 to pull out of the conference, and that the
conference is scaled down to include only two partici-
20 pants A and C. In this case, the logical communication
paths 38 and 40 from the control program 30-A to 30-B
and from 30-B to 30-C, respectively, are disconnected,
and a logical communication path 42 is established from
the control program 30-A to 30-C.

25 Fig. 7E shows that the user A selects the
"end" command 15 in the conference execution command
menu 11 to terminate the conference. All logical

1 communication paths are disconnected in response to the entry of the "end" command.

Figs. 8A-8D show displays on the screen in various states in the progress of a group work. This example is a conference using a material 44 labeled "material" and held by users A and B through the conference window 6 labeled "conference".

Fig. 8A shows the state after the users A and B have opened the conference windows 6-A and 6-B on their workstations. At this time, no logical communication path is yet established between the conference control programs, and these workstations are placed in the individual working environment. Accordingly, each workstation can deal with an individual work in the conference window independently. Indicated by 43-A and 43-B are a field of title affixed to the windows 6-A and 6-B, and they display "(waiting)", indicating that the group work is not yet started. Although materials 44-A and 44-B are placed in the windows from the beginning, they may be introduced from a common database or the like by individual workstations or one material may be transferred from one workstation to another after the conference windows have been opened.

Fig. 8B shows the establishment of a conference by connection of the conference windows 6-A and 6-B through logical communication paths. The workstation have their title fields 43-A and 43-B displaying "(executing)" indicative of the group working

1 status. Instead of the literal display of the
conference executable state, the background color of the
title field or the whole conference window may be
changed.

5 Fig. 8C shows, as a block diagram of program,
the conference field. The conference windows 6-A and 6-
B are displayed on the screens by the respective control
programs 30-A and 30-B, which are connected by the
logical communication paths 37 as mentioned above.

10 Fig. 8D shows the state after the conference
field has been closed and the workstations has resumed
individual works. In this state, the title field
displays "(waiting)" again. The materials 44-A and 44-B
were used in the conference and they were partially
15 modified during the conference in general. Commencement
and termination of a conference (group work) take place
in correspondence to the establishment and disconnection
of the logical communication paths 37, and are identi-
fied by conference control program 30.

20 Figs. 9A and 9B show, as views taken from
one user, the affair of materials used in the group
work.

Fig. 9A shows display of the conference window
6 including an icon 44 which represents a material.

25 When one user operates the mouse to point the icon 44,
the material corresponding to the icon 44 is opened on
the screens of both users.

1 Fig. 9B shows the state after the material
icon 44 has been activated and its content is displayed
in the document window 7. At this time, the material
icon 44 in the conference window 6 has its appearance,
5 e.g., color, changed from the state of Fig. 9A so that
the users are notified of the use of the material.
Addition of a new window in response to the specifica-
tion of material is carried out by the conference
control program, and the beginning and ending of use of
10 each material are recognized by the conference control
program 30.

Figs. 10A-10C show examples of display of the
result of information retrieval pertinent to conferences
or group works which have been held by the conference
15 system in the past. The result of information retrieval
is displayed in the document window 7 in this embodi-
ment.

Fig. 10A shows an example of basic data of the
work information. The data include "name" 50 which is
20 the name given to the group work, "date and time" 52
indicative of the year, month, day and time when the
group work was held, "participants" 54 which are the
names of participants of the group work, and "materials"
56 which are the names of materials referenced by the
25 participants during the group work.

The "name" 50 is determined arbitrarily by the
users to reflect the work. For example, similar
meetings may be named "meeting on specifications"

1 invariably, or one of them may be named "fifth meeting
on specifications". The work information shown in this
embodiment are only examples of basic data, and these
items may be added by "record of conference", "items of
5 decision", etc. It is convenient when each user is
allowed to define information which well reflects the
matter of work, such as "relation with other
conference", "comment", etc.

Fig. 10B shows an example of display of the
10 pictorial information 58 in addition to a literal
display of the conference participant names. The
information 58 includes such static images as photo-
graphs and portraits and video images. The use of the
pictorial information 58 enables the user to search for
15 a person whose name is forgotten.

Fig. 10C shows an example of display of the
classified materials used in the group work. In the
figure, "materials in use" 60 are materials which were
actually referenced by the operator during the work,
20 "received materials" 62 are materials received by the
operator from other participants during the work, and
"transmitted materials" 64 are materials sent by the
operator to other participants during the work. This
display enables the user to search for a "material which
25 was received at that time" based on a faint memory.

Next, an example of operation for searching
group work information will be explained.

1 Fig. 11 shows an example of display on the
display unit 3 when a user requests a work information
search.

 The display screen of the workstation displays
5 the icon 70 with label "search" to be selected by the
user for starting the information retrieval. Although
in this embodiment the search icon 70 is placed alone in
the display for the simplicity of explanation, it is
only one of icons for selecting various functions in
10 practical applications.

 When the user operates the mouse to select the
search icon 70, a menu of query items 72 used by the
user for specifying a search condition and the like
appears on the screen. Although in this example "date
15 and time" 73 is only search condition to be specified,
other conditions such as "name of work" and "number of
participants" for example may be included.

 Character strings 74, 76 and 78 are items of
selection of the display mode for the search result.
20 The user operates the mouse to move the cursor to the
intended character string and depress one of buttons on
the mouse thereby to select the mode. An alternative
manner of selection is to attach numbers to the items
74, 76 and 78 and allow the user to enter the number of
25 the intended item on the keyboard 1. The following
explanation assumes the operator's setting for the "date
for search" to be October 10, 1990.

1 Fig. 12 shows an example of display of the
case when the user has selected "name" 74 as a display
mode for the result of work information search.

Indicated by 80 is the selection mark which appears in
5 response to the selection of the display mode. In this
case, the search result is displayed only in the field
of "name of work" 82 in the document window 7-1. This
display mode is useful for examining multiple group
works at once.

10 Fig. 13 shows an example of display when the
user has selected "icon" 76 as a display mode. The
selection mark 80 is placed at the selected item. In
this mode, the search result is displayed with work
names and icons 84 which signify features of works.

15 This display mode enables the user to find the intended
work intuitively by viewing icons which represent the
categories of works.

Fig. 14 shows typical examples of the work
icons 84. For example, an icon 86 signifies a group
20 work held by three or more participants. Icons may be
created to reflect the matter of works, instead of
expressing the categories of works. Shown by 90 is the
icon of a meeting of a golf club, and 92 is the icon of
a meeting for the study of algorithm.

25 Fig. 15 shows an example of display when the
user has selected "attribute" 78 as a display mode. The
selection mark 80 is placed at the selected item. In
this mode, the search result is displayed with "name of

1 work" 82 accompanied by "attribute of work" 94 such as
the date and time and the names of participants of the
work in the document window 7-1. This display mode
enables the user to know the details of searched works
5 to some extent, and it is suited to find an intended
work directly.

Fig. 16 shows an example of display used to
request more detailed information on the search result
which has been obtained based on the search condition
10 specified on the search menu 72. In this example, the
user has specified "name" 74 and, based on the list of
work names displayed in the document window 7-1, the
user further specifies the name of a work on which
detailed information is needed. For the first selection
15 of "icon" 76 or "attribute" 78, detailed information can
be acquired in the same manner. The name of the work
for which detailed information is to be retrieved is
pointed by a mark 96. The manner of specification is
identical to the selection of an item in the search menu
20 72. In the example of Fig. 16, "meeting on specifica-
tions" is selected for requesting detailed information.

Fig. 17 shows an example of display of the
detailed information which has been requested for the
work. The information is displayed in another document
25 window 7-2. This example includes "date and time",
"names of participants" and "names of materials", and
more detailed information may be included.

1 Fig. 18 shows another example of display of
detailed information. In this example, the content of
the conference room window 6 for the specified work at
the time of execution by the conference system is
5 revived on the screen, and it reveals that a telephone
set, facsimile unit and blackboard were set in the
conference window 6 for the work. This embodiment is
useful for finding or reminding an intended work or a
material used in the work based on information which is
10 laid out attractively.

 Figs. 19A and 19B show other examples of the
conference window 6. The conference window 6 can be
labeled arbitrarily, and the user can bring in a variety
of facilities. Preparations of different environments
15 which meet the demands of various kinds of work are
apparently convenient. For example, provision of two
conference windows 97-1 and 97-2 shown in these figures,
even although they are similar, has the following
advantages.

20 In the embodiments of the invention, the title
affixed to the conference window 6 is used for the name
of a group work which is recorded for the future
retrieval. This allows the user to be free from making
a work name at each event. However, as the number of
25 same work names increases, it will be inconvenient for
the future retrieval, and on this account it is
desirable to use conference windows of different names
for conferences or group works of different categories.

- 1 By merely making this separation at the beginning of each work, the search job is eased significantly.

Information retrieval described above is accomplished based on various tables in the group work
5 database 18 in which information pertinent to conferences and group works held in the past are recorded. The following explains the structure of these tables and the method of creating the tables.

Fig. 20 shows the basic arrangement of a table
10 100 for recording the group work information. The table 100 has a work identification data field 102 and a work matter field 104. The work identification data field 102 is a record of information for separating individual group works, and the work matter field 104 is a record
15 of information specific to each group work.

Figs. 21A-21E show the details of the work identification data field 102. This field includes sub-fields of work name data 106, date and time data 108 and participant data 110, as shown in Fig. 21A. The work
20 name data 106 is the name given to the group work, the date and time data 108 is when the group work is held, and the participant data 110 is the members of the group work.

Fig. 21B shows the details of the work name
25 sub-field 106. This sub-field records the name of conference 112, additional name 114 and pattern data 116. The conference name 112 is the label which is affixed automatically to the conference window (title

1 section) used for the group work, and the additional
name 114 is a sub-name added arbitrarily by the user.
The pattern data 116 is data for producing the icon of
the conference window 6.

5 Fig. 21C shows the details of the date and
time sub-field 108. The date and time data includes a
date and time of access start 118, date and time of
access end 120, date and time of work start 122, and
date and time of work end 124. The access starting date
10 and time 118 is when the conference window 6 is opened
for the group work, i.e., when the conference control
program is initiated. The access ending date and time
120 is when conference window 6 for the group work is
closed, i.e., when the conference control program is
15 terminated. The work starting date and time 122 is when
the group work is started, i.e., when the logical com-
munication paths to other participants are established,
and the work ending date and time 124 is when the group
work is completed, i.e., when the logical communication
20 paths to other participants are disconnected.

Fig. 21D shows the details of the participant
data sub-field 110. The participant data includes the
number of participants 126 and individual participant
data 128 of m sets at maximum. The number of partici-
25 pants 126 is the total count of participants who engage
in the group work, and each individual participant data
128 is identification information of each participant
and the details of participation.

1 Fig. 21E shows the contents of the individual
participant data 128. This data includes a participant
name 130, joining date and time 132, disjoining date and
time 134, image data 136, and video data 138. The
5 participant name 130 is the name of user of the work-
station who joins the conference, the joining date and
time 132 is when the user joins in the group work, the
disjoining date and time 134 is when the user pulls out
of the group work, and the image data 136 and video data
10 138 are to depict the participant.

 Figs. 22A and 22B show the details of the work
matter data field 104 shown in Fig. 20. This field
includes sub-fields for the number of materials 140 and
individual material data 142 of n sets at maximum, as
15 shown in Fig. 22A. The number of materials 140 is the
total count of the materials which are referenced during
the group work, and each individual material data 142 is
identification information of the material and its
access detail.

20 Fig. 22B shows the details of the individual
material data sub-field 142. The individual material
data includes a material name 144, pattern data 146,
access starting date and time 148, access ending date
and time 150, operation type (transmission/reception/
25 deletion) 152, and operating date and time 154. The
material name 144 is the name of the material, the
access starting date and time 148 is when the material
is accessed in the group work, the access ending date

1 and time 150 is when access to the material finishes in
the group work, the operation type 152 is to distinguish
the access mode to the material among transmission,
reception and deletion, and the operation date and time
5 154 is when access to the material finishes.

Fig. 23 is a flowchart of the program 160
which produces the foregoing work information data table
100 in the group work database. The program 160 is a
counterpart of the virtual user interference module 33,
10 as shown in Fig. 5, and it receives the same input data
as that received by the virtual user interference module
33.

Initially, a table entry is produced in the
table 100 preparatory to the collection of work
15 information pertinent to the group work (step 161).
Next, the starting operation for recording the
initiation of the conference control program 30 as the
first step of the group work is held (step 162). Then,
the system waits for the entry of input data by the user
20 or from other conference control program 30' (step 164).

A program routine is executed in response to
the input data: the work start routine 168 for "work
start" command 166, the work end routine 172 for "work
end" command 170, the joining routine 176 for "join"
25 command 174, the disjoining routine 180 for "disjoin"
command 178, the material use starting routine 184 for
"material use start" command 182, the material use
ending routine 188 for "material use end" command 186,

1 the material transmission routine 192 for "material
transmission" command 192, the material reception
routine 196 for "material reception" command 194, the
material deleting routine 200 for "material deletion"
5 command 198, and the termination routine 206 for
"termination" command 202. For input data other than
any of the above-mentioned commands, the program
execution proceeds to other operation routine 204.

Fig. 24 is a detailed flowchart of the
10 starting routine 162 in Fig. 23. This routine sets the
label of the conference window 6 used by the conference
control program 30 to "name of conference" 112 in the
"name of work" sub-field 106 (step 210), sets image data
of the icon of the conference window 6 to "pattern data"
15 116 (step 212), registers all materials (resource icons)
which exist in the conference window 6 at this time
point into the work matter data 104 (step 214), sets the
current date and time to "access starting date and time"
118 of the "date and time" sub-field 108 (step 216),
20 sets "1" to "number of participants" 126 of the
"participant" sub-field 110 (step 218), sets the name of
operator to "participant name" 130 of the individual
participant data 128-1 for the first participant (step
220), and sets the current date and time to "joining
25 date and time" 132 (step 222). In the all-material
registration step 214, even materials which will not be
accessed are registered in the table, as will be
explained for the reason later.

1 Fig. 25 is a detailed flowchart of the
termination routine 206 in Fig. 23. This routine sets
the current date and time to "access ending date and
time" 120 of the "date and time" sub-field 108 (step
5 230), and if the user requests the addition of a name
other than that of "conference name" 112 (step 232), it
sets the specified name to "additional name" 114 of the
"work name" sub-field 106 (step 234).

 Fig. 26 is a detailed flowchart of the work
10 start routine 168 in Fig. 23. This routine sets the
current date and time to "work starting date and time"
122 of the "date and time" sub-field 108 (step 240).

 Fig. 27 is a detailed flowchart of the work
end routine 172 in Fig. 23. This routine sets the
15 current date and time to "work ending date and time" 124
of the "date and time" sub-field 108 (step 250), and if
there is any participant who has not yet pulled out of
the work (step 252), it sets the current date and time
to "disjoining date and time" 134 of the "individual
20 participant data" 128 (step 254). If there exists image
data or video data of the participant (step 256), the
routine sets the image data to "image data" 136 or sets
the video data to "video data" 138 (step 262).

 Fig. 28 is a detailed flowchart of the joining
25 routine 176 in Fig. 23. This routine increments the
value of "number of participant" 126 of the "participant
data" sub-field 110 (step 270), sets the name of a newly
joining participant to "participant name" 130 of the

1 "individual participant data" 128 created for the
participant (step 272), and sets the current date and
time to "joining date and time" 132 (step 274).

Fig. 29 is a detailed flowchart of the
5 disjoining routine 180 in Fig. 23. This routine sets
the current date and time to "disjoining date and time"
134 of the "individual participant data" 128 relevant to
the disjoining participant (step 280), and if image data
or video data of the participant exists (step 282 or
10 286), it sets the image data to "image data" 136 or sets
the video data to "video data" 138 (step 284 or 288).

Fig. 30 is a detailed flowchart of the
material use starting routine 184 in Fig. 23. This
routine makes the entry of "individual material data"
15 142 for the material in the "work matter data" field 104
(step 290), and sets the current date and time to
"access starting date and time" 148 of "individual
material data" sub-field 142 (step 292). The material
name registration process 290 is implemented for the
20 prevention of duplicate registration of materials, as
will be explained later.

Fig. 31 is a detailed flowchart of the
material use ending routine 188 in Fig. 23. This
routine sets the current date and time to "access ending
25 date and time" 150 of the "individual material data"
sub-field 142 relevant to the material (step 300).

Fig. 32 is a detailed flowchart of the
material transmission routine 192 in Fig. 23. This

1 routine makes the entry of "individual material data"
142 for the material in the "work matter data" field 104
(step 290), sets a code indicative of transmission in
"operation type (transmission/reception/deletion)" 152
5 of the "individual material data" sub-field 142 (step
310), and sets the current date and time to "operating
date and time" 154 (step 312).

Fig. 33 is a detailed flowchart of the
material reception routine 196 in Fig. 23. This routine
10 makes the entry of "individual material data" 142 for
the material in the "work matter data" field 104 (step
290), sets a code indicative of reception in "operation
type" 152 of the "individual material data" sub-field
142 (step 320), and sets the current date and time to
15 "operating date and time" 154 (step 322).

Fig. 34 is a detailed flowchart of the
material deletion routine 200 in Fig. 23. This routine
makes the entry of "individual material data" 142 for
the material in the "work matter data" field 104 (step
20 290), sets a code indicative of deletion in "operation
type" 152 of the "individual material data" sub-field
142 (step 330), and sets the current date and time to
"operating date and time" 154 (step 332).

Fig. 35 is a detailed flowchart of the all-
25 material registration routine 214 in Fig. 24. This
routine, if there is a material which has not yet
registered in the "work matter data" field 104 (step
340), increments the value of "number of materials" 140

1 (step 342), makes the entry of "individual material
data" 142 for the material (step 344), sets the name of
the material to "material name" 144 and the pattern data
(icon) to "pattern data" 146 of the entry 142 (step
5 348).

Fig. 36 is a detailed flowchart of the
material registration routine 290 in Fig. 34. This
routine, if the material which is requested to register
is not yet registered in the "work matter data" field
10 104 (step 350), increments the value of "number of
materials" 140 (step 352), makes the entry of
"individual material data" 142 for the material (step
354), sets the name of the material to "material
name" 144 and the pattern data (icon) to "pattern data"
15 146 of the entry 142 (step 358).

According to this invention, as described
above, each time a group work is held, the group work
data table 100 which contains the work identification
data 102 for the work including the work name and its
20 date and time and the work matter data 104 including the
participant names and material names is stored
cumulatively in the data-base automatically. Stored
tables enable the user afterward to search for a group
work based on any key item included in the work
25 identification data 102 or a material used in the work
based on any key item included in the work matter data
104. The program for searching group work data tables
100 stored in the database for intended data is prepared

1 in each workstation as one of interaction programs
(application programs) 34 shown in Fig. 5. This search
program can readily be created by the conventional
technique, and it is not described here.

5 It is appreciated from the above explanation
that the present invention enables information retrieval
based on ambiguous search keys memorized by the people
as relations in the time or spatial domains, such as
"one used in the conference in the afternoon of that
10 day" or "one received in that conference", instead of
using such search keys as material names or material
numbers which are difficult for the people to remember.

CLAIMS

1. A method of storing collaboratively processed information based on a computer network system in which a plurality of terminal units are interconnected through a network, each terminal unit comprising a micro-processor provided with a control program for controlling communication with other terminal units and a plurality of application programs, a display unit and an input unit, and a plurality of users in remote places engage in a group work by making reference to a material which is displayed equally on a screen of the display unit of each terminal unit under control of said control program, said method comprising:

a step of connecting the control programs of said terminal units with a logical communication path, and starting the group work;

a step of creating group work identification data and work matter data that reflects the situation of the group work in a time band which is recognized to be midway of the group work by said control program; and

a step of storing said work identification data and said work matter data in association with each other in a database.

2. A collaboratively processed information storing method according to claim 1, wherein said group work identification data comprises data indicative of the name of the group work and data indicative of the date or the date and time when the group work is held.

3. A collaboratively processed information storing method according to claim 2, wherein said group work identification data further comprises names of participants who engage in the group work.

4. A collaboratively processed information storing method according to claim 2, wherein said data of group work name is data of the name which is given to the window, in which said group work is held, created on the screen of said display units.

5. A collaboratively processed information storing method according to claim 2, wherein said group work identification data further comprises information for identifying a work which is specified arbitrarily by a user.

6. A collaboratively processed information storing method according to claim 1, wherein said group work matter data comprises data indicative of the name of a material which is used in said group work.

7. A collaboratively processed information storing method according to claim 6, wherein said group work matter data further comprises data indicative of the time when said material is referenced.

8. A collaboratively processed information storing method according to claim 6, wherein said group work matter data further comprises information for distinguishing whether said material is the one which is sent to other terminal unit or the one which is received from other terminal unit.

9. A method of storing group work information based on a computer network system in which a plurality of terminal units are interconnected through a network, each terminal unit comprising a display unit having a display screen, an input unit, a processor provided with a control program for implementing communication among said terminal units so that said terminal units operate in unison for information processing in response to input operations on said input units, and a telephone set, and a plurality of participants in remote places engage in a group work by using data displayed on the display screens and voices through said telephone sets, said method comprising:

a step of forming, on the display screen, a visual environment for the group work;

a step of creating work identification data for identifying the group work environment formed on the display screen;

a step of creating work matter data indicative of the situation of the group work in response to a certain user operation taken in the group work environment; and

a step of storing said work identification data and said work matter data in association with each other in a data file for the future information retrieval.

10. A group work information storing method according to claim 9, wherein said work identification

data comprises data of the name which is given to the group work environment formed on the display screen and data of the date or the date and time when the group work is held.

11. A group work information storing method according to claim 10, wherein said work identification data further comprises data of the names of participants who engage in the group work environment.

12. A group work information storing method according to claim 9, wherein said work identification data comprises auxiliary information defined by a user.

13. A group work information storing method according to claim 9, wherein said display unit comprises a multi-window function, the group work environment is formed as one of multiple windows on the display screen, and name data given to said multiple windows is adopted as said work identification data.

14. A group work information storing method according to claim 9, wherein said terminal unit has a function of displaying a plurality of icons or images, which correspond to participants of the group work, on the display screen, and said work identification data comprises icons or images of the participants.

15. A group work information storing method according to claim 9, wherein said work matter data comprises the name of the material which is used in the group work environment.

16. A group work information storing method according to claim 15, wherein said group work matter data comprises information for distinguishing whether the material used in the group work environment is the one which is sent to other terminal unit or the one which is received from other terminal unit.

17. A method of storing and retrieving group work information based on a computer network system in which a plurality of terminal units are interconnected through a network, each terminal unit comprising a display unit having a display screen, an input unit, a processor provided with a control program for implementing communication among said terminal units so that said terminal units operate in unison for information processing in response to input operations on said input units, a telephone set, and file means for storing group work information, and a plurality of participants in remote places engage in a group work by using data displayed on the display screens and voices through said telephone sets, said method comprising:

a step of forming, on the display screen, a visual environment for the group work;

a step of creating work identification data for identifying the group work environment formed on the display screen;

a step of creating work matter data indicative of the situation of the group work in response to a

certain user operation taken in the group work environment;

a step of storing said work identification data and said work matter data in association with each other in said file means for the future information retrieval; and

a step of searching said file means for work identification data and work matter data which fit a search condition specified by a user and displaying the data on the display screen.

18. A group work information storing and retrieving method according to claim 17 comprising a step of displaying a pattern indicative of the group work environment in a pictorial fashion based on retrieved work matter data.

19. A group work information storing and retrieving method according to claim 17 comprising a step, which is in response to a display request for a material corresponding to one of work identification data that fits a search condition entered by a user through said input unit and displayed on the display screen, of displaying the content of the material on the display screen.

20. A group work information storing and retrieving method according to claim 18 comprising a step, which is in response to a display request for a material, of displaying graphical data representing said material on the display screen, the content of the

material corresponding to graphical data selected by a user being displayed on said display screen.

21. A computer network system in which a plurality of terminal units are interconnected through a network so that a plurality of users in remote places engage in a group work by making reference to a material which is displayed equally on the screen of all terminal units, each of said terminal units comprising:

- a display unit having a multi-window function which forms a plurality of windows on the display screen;

- an input unit operated by a user;

- a microprocessor which execute a plurality of application programs in correspondence to windows on the display screen; and

- a data file which stores various material data and group work information;

said microprocessor comprising:

- group work control means for controlling the communication with other terminal unit so that the terminal units operate in unison to carry out information processing in response to an input operation taken on said input unit for a specific window having a group work environment among the multiple windows formed on the display screen;

- means of creating work identification data for the identification of the group work environment and work matter data indicative of the situation of the

group work in response to the input operation on said input unit taken for the specific window, and storing the work matter data in association with the work identification data into said data file; and

means of searching said data file for work identification data and work matter data which fit a search condition specified by the user, and displaying the data on the display screen.

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